

Revision of the *Spyridium bifidum* – *S. halmaturinum* complex (Rhamnaceae: Pomaderreae) from South Australia and Victoria

Jürgen Kellermann^{1,2,3} & W.R. (Bill) Barker^{1,2}

¹ State Herbarium of South Australia, DENR Science Resource Centre, P.O. Box 2732, Kent Town, South Australia 5071; e-mail: juergen.kellermann@sa.gov.au; bill.barker@sa.gov.au

² Australian Centre for Evolutionary Biology and Biodiversity (ACEBB), School of Earth & Environmental Science, The University of Adelaide, South Australia 5005

³ Former address: National Herbarium of Victoria, Royal Botanic Gardens Melbourne, Birdwood Avenue, South Yarra, Victoria 3141

Abstract

The *Spyridium bifidum* – *S. halmaturinum* complex is revised; it consists of eight species and two subspecies. *Spyridium bifidum*, *S. coactilifolium* and *S. halmaturinum* are maintained in revised circumscription. New combinations and names are provided for *S. bifidum* subsp. *wonilloe*, *S. coolitum* and *S. scobridum*. *Spyridium stenophyllum* is re-instated and transferred from *Cryptandro* to *Spyridium*. The following taxa are published as new: *S. fontis-woodii*, *S. furculentum* and *S. stenophyllum* subsp. *renovatum*, the last of which contains most specimens previously referred to as *S. bifidum*. All taxa are described, illustrated and typified; distribution maps are provided.

Keywords: Australia, taxonomy, nomenclature, Rhamnaceae, Pomaderreae, *Spyridium*.

Muelleria 30(1): 26–58 (2012)

Introduction

Spyridium Fenzl. is one of the larger genera of Rhamnaceae in Australia. Comprising about 45 species, it is the third largest genus of the Pomaderreae, a tribe endemic to Australia and New Zealand (Kellermann *et al.* 2005; Kellermann & Udovicic 2008). The genus occurs in temperate and semi-arid south-western and south-eastern Australia. Its main centre of distribution is in South Australia (currently 20 species), with a secondary centre in Western Australia (15 species). Only two species are shared between western and south-eastern Australia. There are eight species of *Spyridium* in Victoria, half shared with South Australia, six species in New South Wales, one extending into south-eastern Queensland, and eight species in Tasmania (see Lepschi *et al.* 2011).

The last treatment of *Spyridium* for South Australia (Canning 1986) recognised 14 species and six infraspecific taxa. Apart from the addition of *S. nitidum* Wakef. and *S. tridentatum* (Steud.) Benth., Canning's (1986) treatment repeated that by Black (1926, 1952) with a few minor amendments. Since 1986 there have been several changes: *Spyridium tridentatum* has been transferred back into the re-established genus *Stenanthemum* Reissek (Rye 1995a; Barker 2005; Thiele 2007) as *St. tridentatum* (Steud.) Reissek; *Spyridium tricolor* W.R.Barker & Rye and *S. erymnocladum* W.R.Barker have been newly described (Barker & Rye 1993, Barker 1995), and *S. waterhousei* F.Muell., which had been long subsumed under *Cryptandra* Sm., has been re-instated (Kellermann 2007b).

The last *Spyridium* treatment for Victoria (Walsh 1999) included seven species, one of which was not published at the time: *Spyridium* sp. 1. Two species endemic to the Grampians were later transferred from *Trymalium* to *Spyridium* (Kellermann 2006b): *S. daltonii* (F.Muell.) Kellermann and *S. xramosissimum* (Audas) Kellermann.



This paper revises the *S. bifidum* – *S. halmaturinum* complex, which mainly occurs in South Australia, but also has one taxon endemic to Victoria.

Taxonomic history and discussion

In the treatments of Black (1926, 1952) and Canning (1986) the *Spyridium bifidum* – *S. halmaturinum* species complex comprised two widespread polymorphic species, *S. bifidum* (F.Muell.) Benth., largely of mainland South Australia and *S. halmaturinum* (F.Muell.) Benth. of Kangaroo Island, and a third species restricted to the vicinity of Victor Harbor, *S. coactilifolium* Reissek. The two former species each contained several varieties. This treatment of the complex has been unsatisfactory as several distinctive taxa with bilobed or emarginate leaves have been referred to as '*Spyridium bifidum*', while three varieties with the same epithet '*integrifolium*' have been used for entire-leaved variants of these bilobed taxa.

The complex is here divided into two main groups of taxa allied with *S. bifidum* and *S. halmaturinum*, following traditional application of the names.

The *Spyridium bifidum* group

The first taxon to be described in this group was *Trymalium bifidum* by Mueller (1855) from specimens collected by Carl Wilhelmi on the Eyre Peninsula at Boston Point, just north of Port Lincoln, and at Marble Range. Reissek (1858) split Mueller's *T. bifidum* into two species, describing the Boston Point collection as *T. stenophyllum*. He characterised this new species as being more slender and having glabrous upper surfaces of the leaves.

Our observations confirm that specimens from these two localities, only c. 50 km apart, are superficially similar on account of the Y-shaped leaves and stipules that are fused for more than half of their length. However, the populations at Marble Range differ in several characters, such as the presence of simple hairs on the upper surface of the leaves and very large, globular, head-like inflorescences. In comparison, the coastal taxon has narrower, glabrous leaves and smaller inflorescences. Furthermore, specimens from Boston Point have bifid stigmas and bicarpellate ovaries, in contrast to the Marble Range specimens, which have trifid stigmas and trilocular ovaries.

Later authors, including Bentham (1863), who transferred *Trymalium bifidum* to *Spyridium*, Black (1926, 1952) and Canning (1986), only accepted *S. bifidum* for all taxa with narrow, forked leaves, regardless of their leaf indumentum or number of carpels. All previously mentioned authors, however, do not seem to have examined the flowers in detail or realised the diagnostic importance of floral characters, as none mentioned carpels or stigma number.

Mueller (1882) transferred all species of *Spyridium*, *Trymalium* Fenzl and *Stenanthemum* into an enlarged *Cryptandra* Sm., since he only accepted the genera *Cryptandra* and *Pomaderris* Labill. in Pomaderreae at that time (Kellermann 2007b). This was reversed by later authors, apart from *Stenanthemum*, the species of which had been subsumed under either *Cryptandra* or *Spyridium* (e.g. Canning 1986) until Rye (1995a) re-instated the genus.

Black (1925) described a distinct entire-leaved form from near Wanilla as *Spyridium bifidum* var. *integrifolium*. This variety is close to *S. bifidum* from Marble Range; it has a trilocular ovary and narrow entire leaves with antrorse simple hairs on the upper surface. Canning (1986) erroneously listed its area of distribution as Kangaroo Island.

During our studies it became apparent that these taxa described in the *Spyridium bifidum* group are well defined and should be recognised. They are restricted to the Marble Range (*S. bifidum* var. *bifidum*), to a range system near Wanilla (*S. bifidum* var. *integrifolium*), and to the eastern Eyre Peninsula, mostly along or near the coast (*Trymalium stenophyllum*). The latter species is transferred by us in this paper to *Spyridium* and the entire-leaved variety of *S. bifidum* is renamed as *S. bifidum* subsp. *wanillae*. However, the majority of specimens from South Australia that have been labelled as '*Spyridium bifidum*' do not match any of the named taxa, since they have the combination of narrow Y-shaped leaves with antrorse hairs and bilocular ovaries. They belong to a taxon that is clearly related to *S. stenophyllum* as both taxa have a 2-carpellate ovary, a condition that is very rare in the tribe Pomaderreae (Kellermann et al. 2006); this new taxon is recognised here as *S. stenophyllum* subsp. *renovatum*.

Many entire-leaved specimens from Kangaroo Island that have previously been labelled *S. bifidum*

var. *integrifolium* cannot be placed in any currently recognised species. They are somewhat similar to *S. coalitum* (see below), but differ in having glabrous upper leaf surfaces and very large infructescences. The relationship of these specimens with *S. thymifolium* Reissek, *S. vexilliferum* (Hook.) Reissek and *S. coalitum* is currently under investigation.

The *Spyridium halmaturinum* group

Together with *Trymalium bifidum*, Mueller (1855) described *T. halmaturinum* based on collections from Kangaroo Island and Encounter Bay. He believed that *T. bifidum* was similar to *T. halmaturinum* and might prove to be conspecific. As he did with *T. bifidum*, Reissek (1858) split *T. halmaturinum*, segregating the mainland specimens from Encounter Bay as *Spyridium coactilifolium*. He recognised the segregates in separate genera.

Bentham (1863) accepted both species, but transferred *T. halmaturinum* to *Spyridium*. He also described *S. coactilifolium* var. *integrifolium*, in which he included *S. thymifolium* Reissek and *S. stuartii* Reissek, but this has not been followed by subsequent botanists, who accepted *S. thymifolium* (including *S. stuartii*) as a separate species (e.g. Black 1926, 1952) or subsumed it under *S. parvifolium* (Hook.) F.Muell. (Tate 1890, as *S. hookeri* F.Muell.). *Spyridium thymifolium* is here considered not to be closely related to *S. coactilifolium*.

Mueller (1875) regarded *S. halmaturinum* and possibly *S. coactilifolium* as varieties of *S. bifidum*. Nevertheless, he accepted all three species in the two editions of his *Systematic Census*, albeit under the genus *Cryptandra* (Mueller 1882, 1889).

We demonstrate that *Spyridium halmaturinum* and *S. coactilifolium* are allied through their conspicuous indumentum of large stellate hairs on the upper surface of the leaves. In *S. coactilifolium*, the leaves are very broadly oblong to ovate or orbicular in shape and usually emarginate, and their indumentum consists of very densely and regularly distributed stellate hairs. Leaves in *S. halmaturinum* vary from cuneate to obcordate and are usually deeply emarginate or bilobed; their indumentum varies in density and simple, 2- or 4-fid hairs are present as well.

Tate (1889a, b, c) described a new species on Kangaroo Island, *Cryptandra scabrida*, with characteristics of

oblong, emarginate leaves with a moderately dense cover of long antrorse to spreading hairs. Notably, Tate published the species with his collection name '*Spyridium scabridum*' as a synonym. Evidently he had not been sure in which genus to place the taxon. It was subsequently transferred to *S. halmaturinum* as var. *scabridum* by Black (1926). In this paper we recognise it as a separate species in *Spyridium*.

Black (1925) described *Spyridium halmaturinum* var. *integrifolium* from Kangaroo Island specimens with entire leaves that carried a similar indumentum to that on the leaves of *S. halmaturinum*. All other species in the *S. halmaturinum* complex have free stipules. This taxon is here raised to specific rank as *S. coalitum*; it differs from typical *S. halmaturinum* in the presence of fused stipules and leaves that are oblong to narrowly elliptic.

For many years, a taxon conspicuous in its forked leaves and stellate indumentum was known from just south of the Little Desert in western Victoria. It was first collected in 1894 by St. E. D'Alton and since then referred to as *Cryptandra bifida*, *Spyridium bifidum* or *S. aff. bifidum* (e.g. Willis 1973). Its distinct status was formally recognised by Walsh (1999), who named it *Spyridium* sp. 1. Although the taxon shares Y-shaped leaves with *S. bifidum* and *S. stenophyllum*, the distinctive stellate hairs, its free stipules and other characters clearly place it into the *S. halmaturinum* group. The species is described formally in this paper as *S. furculentum*.

An isolated atypical population from near Woods Well in the Coorong region of South Australia, has been of continued conservation interest since its discovery in 1973. The taxon was re-collected several times. It has been included in *S. coactilifolium* (e.g. Jessop 1989) or *S. halmaturinum*, species endemic to the Victor Harbor region and Kangaroo Island respectively, but differs from true *S. coactilifolium* in its smaller leaf size and sparse indumentum on the upper surface of the leaves and from *S. halmaturinum* in its leaf shape and infructescence structure. Since, in our opinion, it cannot be subsumed under either species, we recognise a new taxon, *S. fontis-woodii*.

The current view of *S. halmaturinum* has remnant complexity since many populations of taxa within the *S. halmaturinum* group seem to intergrade and hybridisation can frequently be observed with other taxa, such as *S. vexilliferum* (Hook.) Reissek, *S. thymifolium*

or *S. parvifolium* (Hook.) F.Muell., where both parent species occur.

Characters

Characters useful in delimiting species and subspecies of the *Spyridium bifidum* – *S. halmaturinum* complex are summarised in Tables 1 and 2. Usually a combination of these characters is needed to adequately define taxa. Some characters are discussed in more detail below.

Leaf shape. Many authors lumped together taxa with deeply emarginate or Y-shaped leaves. However, three of four taxa in the *S. bifidum* group have cuneate, Y-shaped leaves (the exception being *S. bifidum* subsp. *wanillae*, which agrees in most other characters with *S. bifidum* subsp. *bifidum*) and also one species in the *S. halmaturinum* group (*S. furculentum*). *Spyridium halmaturinum* is very variable in leaf shape and size (see Fig. 4c, and discussion under that species). *Spyridium scabridum* has narrow, emarginate leaves, *S. coactilifolium* and *S. fontis-woodii* have broadly obovate to oblong, emarginate leaves. *Spyridium coalitum* and *S. bifidum* subsp. *wanillae* are the only two taxa with an entire, acute to obtuse leaf apex.

Indumentum. A prime diagnostic feature of the tribe Pomaderreae is stellate hairs (Richardson *et al.* 2000; see also Weberbauer 1895). These are also present on all species of the *S. bifidum* – *S. halmaturinum* complex on most parts of the plants. Features of the indumentum on the upper surface of the leaves are particularly important in defining taxa in the complex, notably the density of the indumentum, the number of arms of stellate hairs, and the presence or absence of simple hairs.

Spyridium halmaturinum and closely related species have stellate hairs with a distinct basal swelling (Fig. 1e; see also Kellermann 2007a), which remains as a tubercle on the leaf surface once the rays of the hairs have fallen off; this basal swelling has not been detected in other species of *Spyridium*. Most species of the *S. halmaturinum* group have a dense (*S. coactilifolium*, *S. halmaturinum*) to sparse (*S. fontis-woodii*, *S. furculentum*) indumentum of stellate hairs on the upper surface of the leaves. *Spyridium scabridum*, while allied to this group by other features, is discordant through having simple hairs on the upper surface that also have a basal swelling.

Taxa in the *S. bifidum* group have simple antrorse hairs on the upper leaf surface and no stellate hairs, with the exception of *S. stenophyllum* subsp. *stenophyllum*, which is glabrous. Density of these simple hairs varies within taxa.

The issue of whether these simple hairs are homologous to stellate hairs still needs to be examined; a paper on hair types in Pomaderreae is in preparation by the first author.

Stipules. The usefulness of stipule characters in delimiting species and genera within Pomaderreae has only come to light recently (Barker 1995; Thiele 2007, expanding the information presented in Thiele & West 2004; Kellermann 2006a). Stipule characters are important in distinguishing taxa within the *S. bifidum* – *S. halmaturinum* complex (Barker 1995). Species of the *S. bifidum* group have stipules that are connate for 1/2 to 2/3 of their length behind the petiole (Fig. 6d, m), whereas *S. halmaturinum* and its relatives *S. coactilifolium* and *S. fontis-woodii* possess free, overlapping stipules. *Spyridium scabridum* has abutting or only slightly overlapping, free stipules. Some species in the complex are very resinous, especially on stipules and bracts. This results in stipules often sticking together and appearing fused, at least in dried specimens. *Spyridium coalitum*, although having many features in common with the *S. halmaturinum* group, has the fused stipules of the *S. bifidum* group.

Inflorescence. Species of *Spyridium* have the flowers arranged in more or less condensed cymes (Thiele 2007), often appearing head-like, with persistent stipule-like bracts subtending the basic flower unit, a dichasium (his Table 1). They are usually subtended by 'floral leaves' that are covered in a dense, white, stellate indumentum and subtend unit-cymes or the whole inflorescence. All but one species in the *S. bifidum* – *S. halmaturinum* complex have head-like inflorescences. The flowers in *S. scabridum* are arranged in more loose cymes, a situation that also occurs in other species of the genus, e.g. *S. daltonii* and *S. globulosum* (Labill.) Benth. (Kellermann 2006b). Both subspecies of *S. bifidum* have very conspicuous, larger flower heads, when compared to *S. stenophyllum*, reflecting a larger number of flowers in each head. Floral leaves are present in all species of the complex.

As it matures, the head-like inflorescence of several species expands, presumably to accommodate the enlarging ovary in developing fruits and to aid the release of the fruits. The bracts of these expanding heads appear in a conspicuous 'tiled' pattern (Fig. 1q). Infructescences of this type are found in *S. coactilifolium*, *S. fontis-woodii*, *S. furculentum*, *S. scabridum* and *S. coalitum* of the *S. halmaturinum* group. They have also been observed in other species of the genus, for example *S. thymifolium*. The distribution of this character throughout the genus requires closer examination of fruiting specimens (which are unfortunately rarely present in herbarium collections) or the observation of plants in the field. In contrast, the infructescences of the remaining species of the complex hardly expand and remain a more or less compact head, without displaying the tiled bract pattern.

Flowers. The species in this complex display the

typical *Spyridium* flower. Indumentum of sepals, hypanthium tube and flower base is used diagnostically. The relative length of limb and claw of the tiny petals has also proved useful in distinguishing groups of species. For example, *S. halmaturinum*, *S. fontis-woodii*, *S. furculentum* and *S. coactilifolium* all have a very short claw relative to the petal length, the limb up to eight times longer than the claw. The claw in the remaining species is longer, the limb only up to twice as long as the claw.

The number of stigma lobes (equalling the number of carpels) is useful in identifying *S. stenophyllum*, as bifid stigmas and bilocular ovaries are very unusual in the genus and the tribe Pomaderreae (see discussion under that species). The usual numbers of carpels and stigmatic lobes in *Spyridium* is three.

Fruits. Generally, fruits in *Spyridium* have the same number of fruitlets as carpels and stigmatic lobes (Thiele

Table 1. Characters distinguishing taxa in the *Spyridium bifidum* group. *Spyridium coalitum* is intermediate and also shares characters with the *S. halmaturinum* group (see Tab. 2).

	<i>S. stenophyllum</i> subsp. <i>renovatum</i>	<i>S. stenophyllum</i> subsp. <i>stenophyllum</i>	<i>S. bifidum</i> subsp. <i>bifidum</i>	<i>S. bifidum</i> subsp. <i>wanillae</i>	<i>S. coalitum</i>
Plant resinous	yes	yes	no	no	yes
Leaf shape	narrowly Y-shaped, cuneate	narrowly Y-shaped, cuneate	Y-shaped, cuneate, obcordate	narrow oblong, oblanceolate, linear	oblong, narrow elliptic
Leaf apex	shallow to deeply emarginate or bilobed	shallow to deeply emarginate to bilobed (rarely almost entire)	deeply emarginate	entire, obtuse to apiculate	entire, obtuse
Leaf margin	revolute	revolute	revolute	revolute	revolute
Stipule fusion	fused > 1/2	fused 1/2 – 2/3	fused > 1/2 (most > 3/4)	fused 1/2 – 3/4	fused
Leaf upper surface indumentum density	medium to dense	glabrous	sparse to medium	dense	sparse to dense, glabrescent
Leaf upper surface hair type	simple, antrorse, long	n/a	simple, antrorse, long	simple, appressed, antrorse, long	stellate, some simple hairs, or both types mixed
Basal swelling on hairs	absent	n/a	absent	absent	present
Branchlet indumentum colour	light brown	white to grey	white to grey	off-white	light to rust brown
Inflorescence diameter	0.6–1.1	0.6–0.8	0.9–1.2	0.8–2	0.5–1.3
Infructescence bracts tiling	absent	absent	absent	absent	present
Petal limb:claw ratio (approx.)	3 : 1	4–5 : 1	2 : 1	5 : 2	2 : 1
Stigma	2-fid	2-fid	3-fid (some appear entire)	3-fid	3-fid
Fruits	pubescent	pubescent	pubescent	pubescent	glabrous

2007) or less (by lack of development after anthesis). There are two distinct types of fruits found in the *S. bifidum* – *S. halmaturinum* complex, which separate the two groups. Fruits of the *S. halmaturinum* group are dark brown or black and either more or less glabrous or with a few simple hairs, especially at the base (Fig. 1h). The *S. bifidum* group has light brown, densely hairy fruits (Fig. 6e).

Black (1926, 1952; and in notes on sheets of his personal herbarium at AD) already observed differences but diverged in his interpretation. He described fruits of *S. coactilifolium* and *S. halmaturinum* as 'brown, crustaceous, [...] glabrous' and 'black, hard, almost glabrous', respectively; and fruits of *S. bifidum* as 'densely silky or villous'. Our observations cannot confirm these differences in texture: fruitlets in all taxa are membranous or papery and white to semi-translucent ('hyaline' in Black's words).

Affinities of the complex

It is difficult to discuss affinities of the members of this complex and other taxa within *Spyridium* in advance of a revision and a more densely sampled phylogenetic analysis (cf. Kellermann *et al.* 2005, Kellermann & Udovicic 2008), particularly as infrageneric groups within the genus are not readily recognisable. However, features restricted to some species, such as different foliar hair types (stellate hairs or antrorse hairs with one to few arms), emarginate to Y-shaped leaves, degree of fusion of stipules, the extent of indumentum on the ovary and fruit, and carpel number, enable some discussion of possible relationships of members of the complex.

The *Spyridium bifidum* group is characterised by: fused stipules; fruits covered in (mainly) long simple hairs with a light brown fruit wall; a light-coloured indumentum

Table 2. Characters distinguishing taxa in the *Spyridium halmaturinum* group.

	<i>S. scabridum</i>	<i>S. halmaturinum</i>	<i>S. fontis-woodii</i>	<i>S. furculentum</i>	<i>S. coactilifolium</i>
Plant resinous	yes	yes	no	no	no
Leaf shape	narrowly obovate, narrowly oblong	obovate, obovate, cuneate, Y-shaped	obovate, obovate, some cuneate	Y-shaped, rarely obovate	round, broadly oblong
Leaf apex	slightly emarginate	shallow to deeply emarginate, often tridentate	shallow to deeply emarginate, rarely tridentate	deeply emarginate; Y-shaped	entire to slightly emarginate, sometimes tridentate
Leaf margin	revolute	revolute	recurved to revolute	revolute	flat to slightly recurved
Stipule fusion	free, abutting or overlapping	free, overlapping	free, overlapping	free, overlapping	free, overlapping
Leaf upper surface indumentum density	medium	medium dense, glabrescent	sparse to medium dense, glabrescent	sparse, glabrescent	sparse to moderately dense
Leaf upper surface hair type	simple: long on younger leaves, shorter and scabrous on older	stellate, rarely also bifid or simple	stellate or bifid, often only simple, sometimes glabrescent	stellate (often only 2–3 arms); subantrorse; hair arms, long, weak	stellate (6–8 arms)
Basal swelling on hairs	present	present	present	present	present
Branchlet indumentum colour	light brown	light brown	rust brown	rust brown	rust brown
Inflorescence diameter	0.5–1.2	0.7–1.1	0.8–1.3	0.6–1.0	0.6–1.7
Infructescence bracts tiling	present	absent	present	present	present
Petal limb:claw ratio (approx.)	4:1	8:1	8:1	8:1	8:1
Stigma	3-fid	3-fid	3-fid	3-fid	3-fid
Fruits	glabrous	glabrous	glabrous	glabrous	glabrous

on young branches; narrow leaves, which are Y-shaped and bear long simple antrorse hairs in most taxa; and the petal limb approximately twice as long as the claw.

Fused stipules occur in only a few species of *Spyridium* and these are potentially related to taxa of the *S. bifidum* group: *S. oligocephalum* (Turcz.) Benth. and *S. polycephalum* (Turcz.) Benth. from W.A.; *S. waterhousei* from Kangaroo Island; Eyre Peninsula endemics *S. erymnocladum* and *S. leucopogon* (F.Muell. ex Reissek) F.Muell.; the more widespread *S. phylloides* Reissek, *S. subochreatum* (F.Muell.) Reissek and *S. eriocephalum* Fenzl. Of these, *S. erymnocladum* and *S. leucopogon* also have fruits covered with simple hairs and are geographically close. *Spyridium leucopogon* somewhat resembles *S. bifidum* subsp. *wanillae*, but is a smaller shrub with smaller flower heads and shorter, glabrous leaves. Leaves of both *S. leucopogon* and *S. stenophyllum* subsp. *stenophyllum* are glabrous and have a recurved mucronate apex, but are much longer and Y-shaped in *S. stenophyllum*. The relationship of all species with fused stipules and the usefulness of this character within the genus is currently under investigation.

The *S. halmaturinum* group is defined as having: free, overlapping stipules; almost glabrous, brown to black fruits; a more or less rusty brown indumentum on young shoots; leaves in a variety of shapes, but generally broader and bearing an indumentum of stellate hairs in most taxa; hairs with a distinct swollen base that remains on the leaf as a tubercle (if the hair arms are deciduous); and in some species a petal limb up to eight times longer than the claw.

Some species of *Spyridium* carry an indumentum of stellate hairs on the upper surface of the leaves (e.g. *S. cinereum* N.A.Wakef. from Victoria and N.S.W, typical forms of *S. majoranifolium* (Fenzl) Rye from W.A., or the widespread *S. subochreatum*), but these are in most instances small, dense stellate hairs, unlike the larger stellate hairs with swollen bases, as seen in *S. halmaturinum* and related species. Occasionally, densely hairy upper leaf surfaces are also seen in plants of species that generally have glabrous or sparsely hairy leaves, such as the widespread south-eastern Australian *S. parvifolium* or *S. globulosum* from W.A. *Spyridium polycephalum* from W.A. has more similar, larger stellate hairs that sit on a tubercle, similar to the swollen bases of *S. halmaturinum*, but the species differs in the presence of fused stipules (see above).

Methods

Descriptions were compiled from herbarium specimen from the following herbaria: AD, BM, CANB, K, MEL, NSW. Taxa were also observed in the field. Measurements of flower parts are made from rehydrated material. The indumentum of the leaves of some species was examined with SEM, but more detailed results will be published elsewhere.

Flower terminology in this and other papers (Kellermann 2006a, b, c) differs from that of Rye (1995a, b, 1996, 2008) and Barker (Barker 1995; Barker & Rye 1993) in the following points: *hypanthium tube* is used for Rye's *free tube* and Barker's *flower tube*, and (*hypanthium*) *base* instead of Rye's *adnate tube* and Barker's *ovary*.

To avoid future confusion, we have chosen not to retain the varietal epithet '*integrifolium*' attributed to three unrelated taxa in this complex when raising these varieties to subspecies or species level.

Identification slips with superseded manuscript names were placed on returned loans and during herbarium visits to MEL and CANB a few years ago. These affect *S. furculentum*, *S. fontis-woodii* and *S. bifidum* subsp. *renovatum*. The replaced names are not presented here to avoid unnecessary publication of *nomina nuda*.

For conservation reasons exact locality information was removed for taxa listed as 'Rare' and 'Vulnerable' (NPWC 2003; Walsh & Stajsic 2007).

Taxonomy

1. *Spyridium coactilifolium* Reissek, *Linnaea* 29: 291 (1858).

Benth., *Fl. Austral.* 1: 431 (1863); M.R.Schomb., *Fl. S. Australia* 37 (1875); F.Muell., *Fragm.* 9: 136 (1875); Tate, *Trans. & Proc. Rep. Roy. Soc. South Australia* 3: 66 (1880); J.M.Black, *Fl. S. Austral.* 3: 368 (1926); ed. 2, 3: 549 (1952); H.Eichler, *Fl. S. Austral. Suppl.* 218 (1965); E.M.Canning in Jessop & Toelken, *Suppl. J.M.Black's Fl. S. Austral.* 2: 815 (1986); R.J.-P.Davies, *Threatened Pl. Species Mt Lofty Ra. & Kangaroo Is. Region* 74–76 (1986); W.R.Barker, *J. Adelaide Bot. Gard. Suppl.* 1: 90 (2005). — *Cryptandra coactilifolia* (Reissek) F.Muell., *Syst. Census Austral. Pl.* 61 (1882). F.Muell., *Second Syst. Census Austral. Pl.* 104 (1889); Tate, *Trans. & Proc. Rep. Roy. Soc. South Australia* 12: 94 (1889); *Handb. Fl. Extratrop. S. Australia* 97 (1890). — *Pomaderris*

coactilifolia F.Muell. ex Reissek, *Linnaea* 29: 291 (1858), *nom. inval. pro syn.* — *Type citation*: 'Encounter Bay (Dr. F. Müller): *Lectotype (here designated)*: Encounter Bay, *s.dat., s.coll.* (MEL 233432, ex Herb. Reissek). *Isolectotypes*: MEL 233435; K (ex Herb. Hookerianum, top three branchlets on sheet with loan stamp and number: H/1310/95 15/76).

Spyridium bifidum auct. non (F.Muell.) F.Muell. ex Benth.: F.Muell., *Fragm.* 9: 136 (1875), *pro parte*.

Illustrations: E.M. Canning in J.P. Jessop & H.R. Toelken, *Flora of South Australia* 2: 816, fig. 429B (1986); R.J.-P.

Davies, *Threatened plant species of the Mount Lofty Ranges and Kangaroo Island regions of South Australia* 74 (1986); A. Prescott, *It's blue with five petals: wildflowers of the Adelaide region* 143, fig. 6 & 145, fig. 3 (1988); G.R.M. Dashorst & J.P. Jessop, *Plants of the Adelaide Plains & Hills*, ed. 3, 101, pl. 43.6 (1990).

Spreading, usually rounded *shrubs* 0.3–1.8 m high, not resinous; young stems densely pubescent with stellate and long simple hairs, first rusty to dark brown, later becoming greyish. *Leaves* alternate: *stipules* free, 1.5–2.5 mm long, reddish brown, overlapping behind

Key to species and subspecies of the *Spyridium bifidum* – *S. halmaturinum* complex

1. Leaves distinctly Y-shaped ('bifid leaves'), the basal part of the blade narrower than the spread of the lobes 2
- 1: Leaves entire, shortly lobed or emarginate, the basal part of the blade broader or as broad as the distal lobes when present 5
2. Upper surface of leaves with stellate hairs; stipules free; fruits almost glabrous; Victoria **3. *S. furculentum***
- 2: Upper surface of leaves with simple hairs or glabrous; stipules fused; fruits densely hairy; South Australia 3
3. Style 2-fid; ovary 2-locular (rarely some 3-locular flowers with 3-fid stigmas present); leaves 1.2–2.8 mm wide; inflorescences 8–11 (–12) mm in diameter 4
- 3: Style 3-fid; ovary 3-locular; leaves 1.9–5 mm wide; inflorescences 10–12 mm diameter **7a. *S. bifidum* subsp. *bifidum***
4. Upper surface of leaves glabrous; leaf-lobes mucronulate, with a recurved apex .. **8a. *S. stenophyllum* subsp. *stenophyllum***
- 4: Upper leaf surface with simple, antrorse hairs; leaf-lobes with a ± obtuse apex hidden by a tuft of hairs **8b. *S. stenophyllum* subsp. *renovatum***
5. Leaves narrowly oblong to narrowly elliptic or narrowly obovate 6
- 5: Leaves broad, obovate to obcordate or cuneate or elliptic to oblong 8
6. Upper surface of leaves with stellate hairs, rarely some simple hairs **6. *S. coalitum***
- 6: Upper surface of leaves with simple hairs only 7
7. Leaves narrowly oblong with an acute, sometimes recurved mucro; stipules fused; hairs on upper leaf surface short, ± appressed, antrorse; inflorescence a compact globular head of sessile flowers **7b. *S. bifidum* subsp. *wanillae***
- 7: Leaves narrowly obovate to narrowly oblong, apex emarginate with a recurved tip, but not mucronate; stipules free or abutting; hairs on upper surface long, antrorse to spreading; inflorescence elongated, a loosely arranged cyme with sessile flowers **5. *S. scobridum***
8. Leaves round to elliptic or broadly oblong; margin ± flat; indumentum on upper surface dense, consisting of evenly spaced stellate hairs (with usually 8 or more arms) **1. *S. coactilifolium***
- 8: Leaves obovate to obcordate, cuneate; margin recurved to strongly revolute; indumentum on upper surface sparse to medium dense, sometimes glabrescent, consisting of stellate hairs, bifid and simple hairs 9
9. Leaves cuneate, obovate to obcordate, rarely Y-shaped, (2.7–) 5.5–10 mm long; indumentum on upper leaf surface of mostly stellate hairs **4. *S. holmaturinum***
- 9: Leaf broadly obovate, 4–8.8 mm long; indumentum on upper leaf surface of some stellate (with up to 6 arms), but mostly bifid and simple hairs **2. *S. fontis-woodii***



Fig. 1. a–h, *Spyridium coactilifolium*: a, habit; b, upper surface of leaf; c, lower surface of leaf; d, upper surface of floral leaf; e, cross-section of leaf with stellate hairs; f, stipules; g, part of flower; h, fruit. **i–l, *S. fontis-woodii*:** i, habit; j, upper surface of leaf; k, lower surface of leaf; l, stipules. **m–q, *S. furculentum*:** m, habit; n, upper surface of leaf; o, lower surface of leaf; p, stipules; q, fruiting flower head from below, showing tiled bracts. a–e, h: W.R. Barker 7612 (AD 173245); f, g: J. Kellermann 438 & H.R. Toelken; i–k: J. Kellermann 441 et al.; l, W.R. Barker 7611 et al.; m, J.A. Jeanes 1499 et al.; 1499; n–q, W.R. Barker 7606 et al. (AD 225116); q, W.R. Barker 7606 et al. (AD 173231). **Scale bar:** a, 17.2 mm; b, c, 5.2 mm; e, 4.2 mm; f, 3 mm; g, 1.25 mm; h, 1.6 mm; i, 17.3 mm; j, k, 5 mm; l, 2.8 mm; m, 18 mm; n, o, 5.25 mm; p, 2.5 mm; q, 6 mm

petiole, glabrous on both sides, with a few cilia and apical hairs; *petiole* 1–2 (–2.5) mm long, densely stellate pubescent; *lamina* broadly ovate to broadly obovate, orbicular or very broadly oblong, (5–) 8–20 mm long, (4–) 5.5–10 (–14) mm wide, base obtuse or truncate, margins \pm flat, apex entire to emarginate, sometimes tridentate, upper surface green, covered with a sparse to moderately dense white to greyish indumentum of stalked stellate hairs, lower surface of a paler colour due to a denser cover of stalked stellate hairs, the hairs on midrib and margins rusty, especially when young. *Floral leaves* usually 4 or 5, smaller than stem leaves: (3.6–) 6–12 mm long, 2.4–9 mm wide, covered with a very dense, white velvety stellate indumentum. *Inflorescence* a dense head of cymosely arranged \pm sessile flowers, 6–17 mm diameter; *bracts* broadly ovate, 1.8–2.2 mm long, 1.5–2 mm wide, margins long-ciliate, sometimes denticulate. *Flowers* white. *Hypanthium tube* 0.6–0.7 mm long, c. 1.5 mm diameter, moderately to densely pubescent with long hairs, becoming sparse when old; base with long hairs. *Sepals* 0.6–0.7 mm long, as long as hypanthium tube, moderately to densely covered with long stellate or simple hairs; sepal:tube ratio 1:1. *Petals* 0.3–0.5 mm long, cucullate, very shortly clawed;

limb:claw ratio c. 8:1. *Stamens* subequal to the petals, 0.25–0.5 mm long; *anthers* 0.2 mm long. *Ovary* inferior, carpels 3, summit covered with stellate hairs with long erect arms; *style* 0.7–0.9 mm long, minutely 3-lobed. *Infructescence* expanding as it matures; bracts in layers, appearing tiled. *Fruits* ellipsoid to obovoid, 1.9–2.3 mm long, 1.5–1.6 mm wide, dark brown, consisting of 3 papery fruitlets, torus apical, externally glabrous or with a few hairs; *seeds* flattened obovoid, c. 1.5 mm long, 0.9–1 mm wide, brown with a few dark spots and a darkened base; aril small, easily detached. Fig. 1a–h. Fig. 3a.

English name: Butterfly spyridium (Canning 1986).

Distribution & habitat: The species occurs in coastal scrub- and heathlands and open woodlands, on limestone hills, exposed cliffs, sandy ridges and dunes. It is endemic to the coast and hinterland between Victor Harbor (known earlier as Port Victor and Encounter Bay), west to Parsons Beach, Fleurieu Peninsula, S.A. (Fig. 2). An old Mount Lofty locality (S.A. *White s.n.*, AD 96803467) is surely erroneous.

Phenology: Flowering nearly all year round, flowers being recorded in Jan.–Apr., July–Oct., Dec. Fruiting specimens have been collected in Aug.–Oct.

Affinities: The species is very closely related to

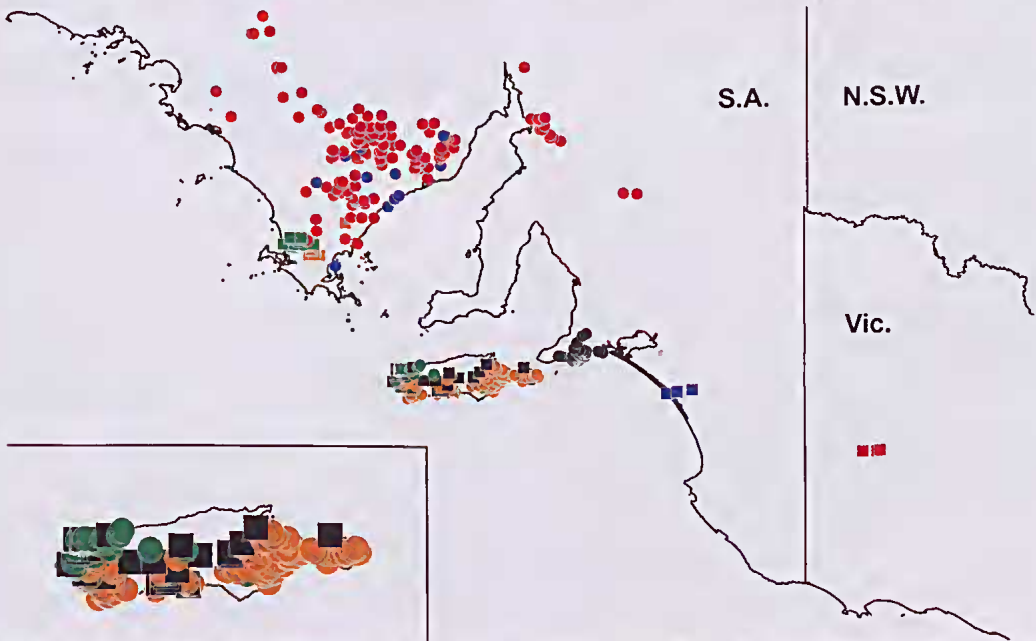


Fig. 2. Distribution map. (Kangaroo Island shown enlarged in inset.) ***Spyridium halmaturinum* group:** *S. coactilifolium*, black circles; *S. fontis-woodii*, blue squares; *S. furculentum*, red squares; *S. halmaturinum*, orange circles; *S. scobridum*, black squares; *S. coolitum*, green circles. ***Spyridium bifidum* group:** *S. bifidum* subsp. *bifidum*, green squares; *S. bifidum* subsp. *wonilloe*, orange squares; *S. stenophyllum* subsp. *stenophyllum*, blue circles; *S. stenophyllum* subsp. *renovatum*, red circles.



Fig 3. a, *Spyridium coactilifolium*: flowering branch. b, c, *S. fontis-woodii*: b, flowering branch; c, inflorescence surrounded by floral leaves. d, e, *S. furculentum*: d, flowering branch with old infructescence, seeds shed (lower left); e, inflorescence (note unusual 4-merous flower). a, W.R. Barker 7612 (AD 173245); b, c, W.R. Barker 7611 et al.; d, e, W.R. Barker 7606 et al. Photos by W.R. Barker.

S. halmaturinum from Kangaroo Island, *S. fontis-woodii* from the Coorong region and *S. furculentum* from the Little Desert, Vic. All four species share the presence of conspicuous large stalked stellate hairs on the upper surface of the leaves and large, free stipules.

Notes: One unusual specimen (*R. Taylor* 234, AD 99751099) does not have dense flower-heads, but more open cymose inflorescences and smaller leaves; these still carry the characteristic stellate indumentum. This is possibly a hybrid with *S. parvifolium*.

Typification: Reissek lived and worked at the Naturhistorisches Museum in Vienna (W); however, no specimens of the species could be found at that institution (*E. Vitek*, pers. comm., Jan. 2008). There are two specimens collected at Encounter Bay at MEL, one of which is labelled by Mueller as "*Spyridium* (Trym?) *coactilifolium* Ferd. M. / Encounter Bay"; and by Reissek and Bentham as *S. coactilifolium*. This specimen is from Reissek's own herbarium and is designated here as lectotype. The sheet carries a recent annotation by unknown hand that it was probably collected by Charles Stuart, who collected at Encounter Bay in November 1847, before Mueller arrived in Australia. However, the basis of this claim could not be established. It is as likely that Mueller visited Encounter Bay when he lived in South Australia (1847–1851). The second MEL specimen, as well as a duplicate at K, are isolectotypes.

Conservation: The species has a narrow distributional range and is listed as 'Vulnerable' in S.A. and nationally (*Willson & Signall* 2008).

Etymology: The epithet is composed of the Latin *coactilis*, made thick, felted (*Georges* 1913), and *folium*, leaf, on account of the densely stellate indumentum on the upper surface of the leaves.

Selected specimens examined (c. 100 seen): SOUTH AUSTRALIA. SOUTHERN LOFTY: [Precise locality information withheld for conservation reasons] W of Victor Harbor, 25 Sep. 1972, *C.R. Alcock* 3974 (AD, MEL); Parsons Beach entry road, 29 Oct. 1995, *W.R. Barker* 7613 & *R.M. Barker* (AD, MEL); Port Victor, 12 Feb. 1894, *R. Brummitt* s.n. (AD); Waitpinga Beach, 3 Dec. 1985, *N.N. Donner* 11208 (AD, AK, BR, BRI, CAS, H, I, LSU, PE, PTBG, TCD); Newland Head, 28 May 1986, *N.N. Donner* 11273 (AD, JBVN, MA, MEL, PRE); Parsons Beach, 22 Oct. 2006, *J. Kellermann* 438 & *H.R. Toelken* (AD); Newland Head C.P., 8 Dec. 2008, *R. Taylor* 1133 (AD); Fleurieu Peninsula, Victor Harbor–Waitpinga road, 12 Oct. 1995, *F. Udovicic* 322 (AD, CANB, MEL, PERTH); Newland Hill, 23 Nov. 1983, *D.J.E. Whibley* 8969 (AD, CANB, DAO, RSA, UTEP);

Newlands Head, 1 Oct. 1985, *D.J.E. Whibley* 9996 (AD, GZU, HO, STU); Newlands Head, 2 Oct. 1985, *D.J.E. Whibley* 10053 (AD, MEL).

2. *Spyridium fontis-woodii* Kellermann & W.R.Barker, *sp. nov.*

A Spyridio coactilifolio Reissek foliis minoribus indumento superficiali grossiore ex pilis simplicibus bifidisque vel raro stellatis (plerumque 3–6 radiatis) constanti differt.

Holotypus: SOUTH AUSTRALIA. [Precise locality information withheld for conservation reasons] Road near Woods Well, 22. Oct. 1995, *W.R. Barker* 7611, *R.M. Barker* & *E. Kuzmanov* (AD 173247). *Isotypi:* B, BRI, CANB, MEL, NSW, NY, PERTH, SI.

Spyridium halmaturinum var. *halmaturinum* auct. non (*F. Muell.*) *F. Muell.* ex *Benth.*: *E.M. Canning* in *Jessop & Toelken*, *Fl. S. Austral.* 2: 817 (1986), *pro parte*; *W.R. Barker*, *J. Adelaide Bot. Gard. Suppl.* 1: 90 (2005), *pro parte*.

Spyridium coactilifolium auct. non *Reissek*: *W.R. Barker* in *Jessop*, *List Vasc. Pl. S. Austral.*, ed. 4, 55 (1993), *pro parte*.

Slender shrubs to 1.8 m high, not resinous; young stems densely pubescent with stellate and long simple hairs, first rusty, later becoming greyish. Leaves alternate: stipules ovate, 1.6–2.6 mm long, free, brown, overlapping behind petiole, glabrous on both sides, apart from a few hairs along midrib and sometimes a few cilia or apical hairs; petiole 1–2 mm long, densely stellate pubescent; lamina broadly obovate to obcordate or very broadly oblong, 4–8.8 mm long, 3.5–6.5 mm wide, base obtuse, margins recurved to revolute, apex emarginate, rarely tridentate, upper surface green, sparsely to moderately covered with a white to greyish hispid indumentum of simple and bifid hairs, sometimes stellate hairs, becoming glabrous with age, lower surface of a paler colour due to a denser cover of stalked stellate hairs. Floral leaves usually 4 or 5: 3.5–5 mm long, 3–4.3 mm wide, covered with a very dense, white velvety stellate indumentum. Inflorescence a dense head of cymosely arranged ± sessile flowers, 8–13 mm diameter; bracts broadly ovate to orbicular, 1.3–1.5 mm long, with long cilia and long hairs outside on lower half, margin sometimes denticulate. Flowers white to cream. *Hypanthium* tube 0.2–0.5 mm long, 1.2–1.5 mm diameter, densely pubescent with long

hairs, becoming more sparsely so when old, base with denser long hairs. *Sepals* 0.7–0.8 mm long, longer than hypanthium tube, densely covered with long stellate or simple hairs; sepal:tube ratio 2–3:1. *Petals* 0.3–0.4 mm long, cucullate, very shortly clawed, cream to yellow; limb:claw ratio c. 8:1. *Stamens* subequal to the petals, c. 0.4 mm long; *anthers* c. 0.2 mm long. *Ovary* inferior, carpels 3, summit covered with long erect stellate hairs; *style* 0.5–0.7 mm long, minutely 3-lobed. *Infructescence* expanding as it matures; bracts in layers, appearing tiled. *Fruits* ellipsoid to obovoid, 2–2.2 mm long, 1.2–1.8 mm wide, dark brown, consisting of 3 papery fruitlets, torus apical, externally glabrous or with a few hairs; *seeds* flattened obovoid, 1.2–1.5 mm long, 0.8–0.9 mm wide, light brown or brown with a few dark spots and a darkened base; aril small, easily detached. Fig. 1i–l, Fig. 3b–c.

Distribution & habitat: The species occurs in *Eucalyptus diversifolia* Bonpl. open shrubland, on light brown sand, usually over partially exposed limestone. It is restricted to an area near Woods Well, S.A. (Fig. 2).

Phenology: Flowering and fruiting material has been collected in Oct.

Affinities: The species shares with *S. furculentum* the less stellate indumentum on the upper side of the leaves. It is close to *S. halmaturinum* and *S. furculentum* in its coarser type of stellate hairs which are not as evenly distributed. The leaf shape, however, resembles that of *S. coactilifolium*, but leaves in *S. fontis-woodii* are much smaller.

Conservation: Location details indicate that the species is likely to be confined to one population, despite its taxonomic and conservation significance being known for over 30 years. It occurs in an unreserved area of paddocks and roadside, which has been extensively cleared and is under threat from crop and invasive plants, and road use and maintainance. The population is estimated to number well over 20 plants, but is unlikely to be more than 50 plants (*W.R. Barker 7611 et al.*). As a result it is recommended that it should be treated as 'Critically Endangered' under the IUCN criteria used in State conservation assessments (NPWC 2003).

Etymology: The specific epithet, a substantive in genitive form, is derived from the name of the neighbouring locality Woods Well, which was

named by Thomas Burr, Deputy Surveyor-General of South Australia, on 18. June 1844 after a 'Mr Wood' (Geographical Names Unit 2000-). The Latin *fons* means well or spring.

Specimens examined: SOUTH AUSTRALIA. SOUTH EAST: [Precise locality information withheld] W of Woods Well, 19 May 1973, *M. Crisp 472* (AD); Road near Woodwell [Woods Well], 22 Sep. 1973, *L. Haegi 540* (AD); Road near Woods Well, N side of road, 15 Dec. 2007, *J. Kellermann 441 et al.* (AD); Road near Woods Well, N side, roadside cutting, 30 Jan. 2006, *H.P. Vonow 2875, D.J. Duval & M.K. Jones* (AD); Road near Woods Well, 7 Nov. 1983, *C.E. Woolcock 1323* (AD); Road near Woods Well, 15 Oct. 1984, *C.E. & D.T. Woolcock s.n.* (MEL).

3. *Spyridium furculentum* W.R.Barker & Kellermann, *sp. nov.*

A *Spyridio halmaturino* (*F.Muell.*) *F.Muell. ex Benth. foliis bifidis profunde emarginatis, indumento superficiali sparso et vertice ovario dense pubescente diagnoscenda.*

Holotypus: VICTORIA. [Precise locality information withheld for conservation reasons] Cooack Settlement Rd, S of Little Desert N.P. boundary, 21 Oct. 1995, *W.R. Barker 7606, R.M. Barker & E. Kuzmanov* (AD 173231). **Isotypi:** AD, B, BM, CANB, K, MEL, MO, NSW, NY, PERTH, SI, W.

Spyridium sp. nov. (Little Desert) *sensu* J.H.Ross, *Census Vasc. Pl. Victoria*, ed. 5, 103 (1996) — *Spyridium* sp. 1 *sensu* N.G.Walsh in N.G.Walsh & Entwisle, *Fl. Victoria* 4: 119 (1999). J.H.Ross, *Census Vasc. Pl. Victoria*, ed. 6, 107 (2000); N.G.Walsh & Stajsic, *Census Vasc. Pl. Victoria*, ed. 8, 120 (2007). — *Spyridium* sp. (Little Desert) (SPRAT database). — *Spyridium* sp. *Little Desert* (*N.G.Walsh 4767*) (Austral. Pl. Census database).

Cryptandra bifida *auct. non* F.Muell.: St.E.D'Alton, *Vict. Naturalist* 30: 68, 75 (1913), *pro parte.*

Spyridium bifidum *auct. non* (F.Muell.) Benth.: J.H.Willis, *Handb. Pl. Victoria* 2: 370 (1973), *pro parte*; N.G.Walsh in S.J.Forbes *et al.*, *Census Vasc. Pl. Victoria* 75 (1984), *pro parte*; J.H.Ross, *Census Vasc. Pl. Victoria*, ed. 4, 96 (1993), *pro parte.*

Illustrations: N.G. Walsh in N.G. Walsh & T.J. Entwisle, *Flora of Victoria* 4: 118, fig. 20h (1999); M.G. Corrick & B.A. Fuhrer, *Wildflowers of Victoria and adjoining areas* 200, fig. 700 (2000), photo.

Shrub to c. 1.6 m high, not resinous; young branchlets densely pubescent with stellate (and possibly long

simple) hairs, first rusty, later becoming greyish. *Leaves* alternate: *stipules* broadly ovate, 1.3–2.8 mm long, free, reddish-brown, overlapping behind petiole, glabrous outside or with few hairs along midrib, margin moderately ciliate; *petiole* 0.9–1.5 mm long, sparsely stellate-hairy, soon becoming glabrous; *lamina* Y-shaped, rarely cuneate with an apical notch, 6–11 mm long, (1.7–) 3.3–7.5 (–8) mm wide, base obtuse, margin revolute, deeply bilobed or emarginate, lobes mostly half as long as undivided part of leaf, upper surface initially with scattered 2- or 3-armed or stellate hairs, arms spreading or slightly antrorse, usually becoming glabrous, but tuberculate (from bases of fallen hairs) at least towards the apex and along the margin, lower surface sparsely to moderately pubescent with stalked stellate hairs. *Floral leaves* 2–5: obcordate, cuneate or Y-shaped, 3.3–5.5 (–8) mm long, (2–) 3–4.5 (–5) mm wide, densely white stellate-pubescent on upper surface. *Inflorescence* a terminal hemispherical head of cymosely arranged sessile flowers 0.6–10 mm diameter; *bracts* broadly ovate 2–2.3 mm long, mostly glabrous, long-ciliate, sometimes with hairs on midrib. *Flowers* white to cream. *Hypanthium tube* 0.4–0.5 mm long, 0.7–1 mm diameter, moderately pubescent with long hairs, base with long hairs. *Sepals* 0.6–0.8 (–0.9) mm long, slightly longer than hypanthium tube, densely white pubescent, especially towards apex; *sepal:tube* ratio 3:2. *Petals* 0.3–0.5 mm long, cucullate, shortly clawed; *limb:claw* ratio 5–8:1. *Stamens* subequal to the petals, 0.4–0.5 mm long; *anthers* c. 0.2 mm long. *Ovary* inferior, carpels 3, summit densely pubescent with erect stellate hairs; *style* 0.6–0.8 mm long, entire; *stigma* minutely 3-lobed. *Infructescences* somewhat expanding as it matures so the bracts are appearing tiled and in layers. *Fruit* ovoid, (1.8–) 2–2.5 mm long, 1.4–1.6 mm wide, dark brown, consisting of 3 papery fruitlets, torus in upper 1/3 or apical, externally glabrous or with a few hairs; *seeds* flattened ellipsoid, c. 1.9 mm long, 1–1.1 mm wide, light brown with black mottles and a darkened brown base; *aril* small, easily detached. Fig. 1m–q, Fig. 3d–e.

English name: Forked spyridium (D'Alton 1913; Walsh 1999).

Distribution & habitat: The new species is endemic to a small area near the southern boundary of the Little Desert between Goroke and Dimboola. It grows in mallee woodland dominated by *Eucalyptus arenacea* Marginson & Ladiges and *Callitris rhomboidea* R.Br.

ex Rich. & A.Rich. with a diverse sclerophyllous shrub understorey on (deep) brown-white sand. (Fig. 2).

Phenology: Flowers recorded Feb., May, Aug.–Nov.; Fruiting: Aug–Nov.

Affinities: The species is closely related to *S. halmaturinum* and *S. fontis-woodii*, with which it shares a similar indumentum on the upper surface of the leaves, free stipules and glabrous fruit, but both species are more pubescent plants with relatively broader, shallowly emarginate leaves. *S. furculentum* differs in its deeply emarginate, bifid or Y-shaped leaves, and the fact that the upper leaf surface soon becomes glabrous. It is not closely allied to *S. bifidum* as has been indicated in the past (D'Alton 1913; Willis 1973); that taxon is endemic to Eyre Peninsula and differs in having generally narrower, less deeply bifid leaves that are silky-pubescent to almost glabrous above, fused stipules, and densely hairy fruits.

Notes: St. Eloy D'Alton was the first to collect the species in 1894 from Cooack Parish at the southern border of the Little Desert and he sent a specimen to Mueller, who labelled it *Cryptandra bifida* (D'Alton 1913). Mueller never stated this fact in any of his publications, but there is a handwritten entry in his personal copy of *Key to the system of Victorian plants, Vol. II* (1885), his last comprehensive account of the Victorian flora, appending *Cryptandra bifida* to the list of Rhamnaceae in Victoria; the copy with copious annotations and additions is held at the library at AD.

Conservation: The species is endemic to a small area near the Little Desert in Victoria. It is listed as 'Endangered', both for Victoria and Australia (Walsh & Stajsic 2007). A national recovery plan has been prepared (Carter & Downe 2006).

Etymology: The epithet derives from the Latin *furcatus*, forked, and the suffix *-ulentus*, indicating marked development, referring to the prominently forked leaves, unique in the *S. halmaturinum* group.

Specimens examined: VICTORIA. LOWAN MALLEE / MURRAY MALLEE: [Precise locality information withheld] Little Desert, NNW of Mt Arapiles Parish Coorak [sic], 30 May 1965, A.C. Beauglehole 19091 (AD, MEL); Cooak [sic] Parish, at the southern fringe of Little Desert, northerly from Mitre Lake., 1894, St.E. D'Alton s.n. (MEL); Dimboola, 1899, St.E. D'Alton s.n. (MEL); N.W. district, 1896, St.E. D'Alton 5 (MEL); Cooak [sic] Settlement Rd, 6 Aug. 1998, A.C. Cochrane 71, N.G. Walsh & J.G. Eichler (MEL); Near SE corner Little Desert N.P., bush block, 6 Aug. 1998, A.C. Cochrane 81, N.G. Walsh & J.G. Eichler (MEL);

Little Desert, W of Nhill–Gymbowen road, 1 Nov. 1975, M.G. Corrick 5372 (AD, MEL); Cooack, private property, 21 Sep. 2005, J.A. Jeanes 1499, N.G. Walsh & H. Rommelaar (MEL, AD); Cooack Settlement Rd, reserve between road and property fence, 16 Aug. 2001, J. Kellermann 134, N.G. Walsh & I.R. Thompson (AD); About midway along an approx. straight line connecting Goroce and Dimboola, 28 Aug. 1972, O. Thompson & A. Lindner s.n. (MEL); NE of Nurcoung Public Hall, Cooack Settlement Rd, 24 Feb. 1999, D.R. Venn s.n. (MEL); Cooack fire access road, NNW of Mitre, 6 Aug. 1998, N.G. Walsh 4767 (AD, MEL).

4. *Spyridium halmaturinum* (F.Muell.) F.Muell. ex Benth., *Fl. Austral.* 1: 432 (1863).

M.R.Schomb., *Fl. S. Australia* 37 (1875); Tate, *Trans. & Proc. Rep. Roy. Soc. South Australia* 3: 66 (1880); *Trans. & Proc. Rep. Roy. Soc. South Australia* 6: 158 (1883); J.M.Black, *Fl. S. Australia* 3: 369 (1926); ed. 2, 3: 550 (1952); H.Eichler, *Suppl. J.M.Black's Fl. S. Austral.* 218 (1965); E.M.Canning in Jessop & Toelken, *Fl. S. Austral.* 2: 815 (1986); W.R.Barker, *J. Adelaide Bot. Gard. Suppl.* 1: 90 (2005). — *Trymalium halmaturinum* F.Muell., *Defin. Austral. Pl.* 42 (1855); *Trans. & Proc. Victorian Inst. Advancem. Sci.* 1: 121 (1855); Hooker's *J. Bot. Kew Gard. Misc.* 8: 40 (1856). Reissek, *Linnaea* 29: 283 (1858). — *Cryptandra halmaturina* (F.Muell.) F.Muell., *Syst. Census. Austral. Pl.* 61 (1882). Tepper, *Trans. & Proc. Rep. Roy. Soc. South Australia* 10: 288 (1888); Tate, *Trans. & Proc. Rep. Roy. Soc. South Australia* 12: 94 (1889); *Second Syst. Census. Austral. Pl.* 104 (1889); Tate, *Handb. Fl. Extratrop. S. Australia* 97 (1890). — *Type citation*: 'On sandy ridges of Kangaroo Island and Encounter Bay'. — *Lectotype (here designated)*: **SOUTH AUSTRALIA**. Kangaroo Island, F. Mueller (MEL 2104215). *Isolectotype*: K (ex Herb. Hookerianum, sheet with loan stamp and number: H/1310/73 20/76). *Residual syntypes*: Sandy scrub, Waterhouse (K ex Herb. Hookerianum, sheet with loan stamp and number: H/1310/73 21/76); all syntypes of *S. coactilifolium* (q.v.; see Typification below).

Spyridium bifidum auct. non (F. Muell.) F. Muell. ex Benth.: F.Muell., *Fragm.* 9: 136 (1875), *pro parte*.

Illustrations: E.M. Canning in J.P. Jessop & H.R. Toelken, *Flora of South Australia* 2: 816, fig. 429D (1986); A. Prescott, *It's blue with five petals: Kangaroo Island field guide* 51, fig. 9 (1995); both as *S. halmaturinum* var. *halmaturinum*.

Shrubs 0.3–2 m high, resinous, especially on stipules and bracts; young stems densely pubescent with light brown stellate and long simple hairs, later becoming greyish. *Leaves* alternate: *stipules* ovate to broadly ovate, (1–) 1.8–2.7 (–3.8) mm long, free, reddish-brown, overlapping behind petiole, glabrous on both sides, a few cilia or apical hairs, sometimes hairs along midrib; *petiole* (0.8–) 1.5–2 mm long, densely stellate pubescent; *lamina* broadly obcordate to broadly cuneate or broadly oblong or Y-shaped, (2.7–) 5.5–10 mm long, (2.5–) 4.2–6 (–8) mm wide, base obtuse, margins recurved to revolute, apex shallowly to deeply emarginate, often tridentate, upper surface grey-green, covered with a medium to dense white to greyish indumentum of coarse stalked stellate hairs (some hairs bifid or simple), with hairs breaking off when older so that the hair-bases remain, lower surface with a similar, but usually denser indumentum, hairs on midrib sometimes reddish brown when young. *Floral leaves* usually 5 or 6: (2–) 4.2–5.7 (–9) mm long, (1.8–) 2.8–5.5 (–6.3) mm wide, covered with a very dense, white velvety stellate indumentum. *Inflorescence* a dense head of cymosely arranged ± sessile flowers, (3.5–) 7–11 mm diameter; *bracts* broadly ovate, 1.2–2 mm long, with long cilia and few hairs outside on midrib and lower half. *Flowers* white to cream. *Hypanthium tube* 0.4–0.7 (–0.8) mm long, 1–1.4 (–1.8) mm diameter, with a few long woolly hairs, base with long hairs. *Sepals* 0.6–0.8 mm long, about as long as hypanthium tube, moderately covered with woolly stellate and simple hairs; *sepal:tube* ratio 1–1.5:1. *Petals* 0.4–0.5 mm long, cucullate, very shortly clawed; *limb:claw* ratio c. 8:1. *Stamens* subequal to the petals, 0.3–0.4 (–0.5) mm long; *anthers* c. 0.2 mm long. *Ovary* inferior, carpels 3, summit glabrous or with very few erect stellate hairs; *style* 0.6–0.8 mm long, minutely 3-lobed. *Infructescence* not or hardly expanding as it matures. *Fruits* ellipsoid to obovoid, 1.7–2.2 mm long, 1.2–1.5 mm wide, dark brown, consisting of 3 papery fruitlets, of which frequently only one develops fully, torus apical, externally glabrous or with a few hairs; *seeds* flattened obovoid, 1.1–1.5 mm long, 0.8–1 mm wide, light brown with dark spots and a darkened base. Fig. 4a–e, Fig. 5a–b.

English name: Kangaroo Island spyridium (Canning 1986).

Distribution & habitat: The species occurs mainly in the southern half of Kangaroo Island. It grows in costal heath- and scrubland and low mallee woodland, mainly on shallow sand over limestone, (consolidated) dunes and on limestone cliffs (Fig. 2).

Phenology: Flowering in Aug.–Mar.; fruits recorded in Dec.–Jan.

Affinities: *Spyridium halmaturinum* is closely related to *S. coactilifolium*, *S. fontis-woodii* and *S. furculentum*. All have stipules that are not fused, unlike those of the *S. bifidum* group, and distinctly stalked stellate hairs on their leaves. These hairs have a thickened base, which, when they break off, remains as a conspicuous tubercle (see Fig. 1e).

Spyridium coactilifolium differs from *S. halmaturinum* in its broader, more rounded leaves, which carry a very regular indumentum of stellate hairs, the margin flat to only slightly recurved and the hairs on the midrib and leaf margin of the lower surface rusty in colour; typical *S. halmaturinum* has deeply emarginate Y-shaped to tridentate leaves with revolute margins, a dense to medium indumentum of uniform colour, the midrib on the lower leaf surface only sometimes having rusty hairs. Young stems of *S. coactilifolium* carry a distinct rusty indumentum, in comparison to the light brown indumentum of *S. halmaturinum*.

Notes: Leaf shape and size is quite variable in *S. halmaturinum* (Fig. 4c). Specimens found inland, from around Vivonne Bay and Kelly Hill have smaller and more rounded leaves, and approach *S. fontis-woodii*. However, the inflorescence of this species expands in fruit and displays distinctly tiled bracts; it also differs in its characteristic leaf indumentum.

Spyridium furculentum is the only species in the *S. halmaturinum* group to have deeply Y-shaped leaves, a character that distinguishes it immediately from the other taxa, including *S. halmaturinum*. *Spyridium coactilifolium*, *S. fontis-woodii* and *S. furculentum* are also not very resinous, whereas *S. halmaturinum* is often very resinous and sticky, similar to *S. scabridum*.

Typification: This taxon is endemic to Kangaroo Island. There is one sheet at MEL labelled "Pomaderris (Trymalium) halmaturina Ferd. Mueller / Kangaroo Island Dr M", and this is selected as lectotype. A specimen at K with a similar label is designated as isolectotype. The

syntypes from Encounter Bay, cited by Mueller in the protologue are *S. coactilifolium*.

Conservation: The species is scattered to abundant in reserved and unreserved areas across Kangaroo Island and not considered at risk.

Etymology: The epithet is derived from the Latin name of Kangaroo Island, *Insula Halmaturorum* (*halmaturus*: kangaroo), where the species is confined.

Selected specimens examined: (c. 150 seen); **SOUTH AUSTRALIA.** KANGAROO ISLAND: Main road; southern entry to American River, 22 Oct. 1986, C.R. Alcock 10659 (AD, HO, I); Hanson Bay, c. 300 m SW of mouth of South West R.; 9 km direct SW of Karatta, 7 Oct. 1982, W.R. Borker 4507 (AD, MEL); E side of Harriet R. mouth at Vivonne Bay, c. 700 m S of South Coast Rd on road to Vivonne Beach, 9 Oct. 1982, W.R. Barker 4535 (AD); Loveringa, D'Estrees Bay, c. 500 m NNW of boat ramp corner, 27 Sep. 1995, W.R. Borker 7521 & F. Udovicic (AD); Birchmore Lagoon, 27 Sep. 1995, W.R. Borker 7531 & F. Udovicic (AD); Between Vivonne Bay to D'Estrees Bay, 10 Oct. 1992, R. Botes 29405 & R. Cox (AD, CAN8); Kelly Hill Caves, 29 Apr. 1961, J.B. Cleland s.n. (AD); 1.6 km NE of Cape Du Couedic lighthouse, 6 Nov. 1989, P. Copley, C. Boxter & B. Overton NPPI 20078 (AD); c. 25 km SW of Penneshaw on road to Parndana, 20 Dec. 1994, D.D. Cunningham 1205 & P. Matthews (AD, CAN8); Kelly Hill, near look-out, 14 Nov. 1958, H. Eichler 15492 (AD); Kelly Hill C.P., 28 Nov. 1987, G. Jackson 1894 (AD); Kelly Hill C.P., E of camping area, 19 May 1989, G. Jackson 1999 (AD); At the base of Mt Stockdale, 17 Sep. 1989, G. Jackson 2027 (AD); Dudley Peninsula, East-West Rd, between sections 431 and 151, Hundred of Dudley, 3 km NW of Wilson R. crossing on Main Rd, 19 Aug. 1982, E.N.S. Jackson 4294 (AD, CBG, MEL); South Coast Rd, Eleanor R. crossing, c. 6 km SW from Seal Bay turnoff, 20 Aug. 1982, E.N.S. Jackson 4349 (AD, CAL, DELHI, SING, ZT); Mt Taylor C.P., hillside of Mt Taylor near cave, 25 Aug. 1982, E.N.S. Jackson 4481 (AD, CAN8, MEL); Section 51, Hundred of Seddon, 3 km SW of Murray Lagoon, 14 Oct. 1986, D.N. Kraehenbuehl 5613 (AD, CAN8, LE); Cape de Couedic lighthouse, car park, 14 Oct. 2009, J. Kellermann 496 & 497 & I.M. Kellermann Williams (AD); Remarkable Rocks, start of loop walk on side of track, 14 Oct. 2009, J. Kellermann 498–500 et al. (AD); Eleanor R. crossing, 5 bridge on W side of road, 17 Oct. 2009, J. Kellermann 534–536 (AD); Pt Ellen, c. 200 m N of car park, 17 Oct. 2009, J. Kellermann 532 (AD); 5 miles from D'Estrees Bay, 30 Aug. 1964, M.E. Phillips s.n. (AD, CAN8); Mt Taylor C.P., 7 Oct. 1978, A.G. Spooner 6066 (AD); Vivonne Bay Rd, 11 Dec. 2006, M.J. Thorpe 26 (AD, MEL); 50 m SW of Hog Bay Rd and Min Oil Rd intersection, 30 Sep. 1995, F. Udovicic 261 (AD, CAN8, MEL, PERTH); Willson R., Feb. 1894, Mrs J. Willson jnr s.n. (AD, MEL, NSW).

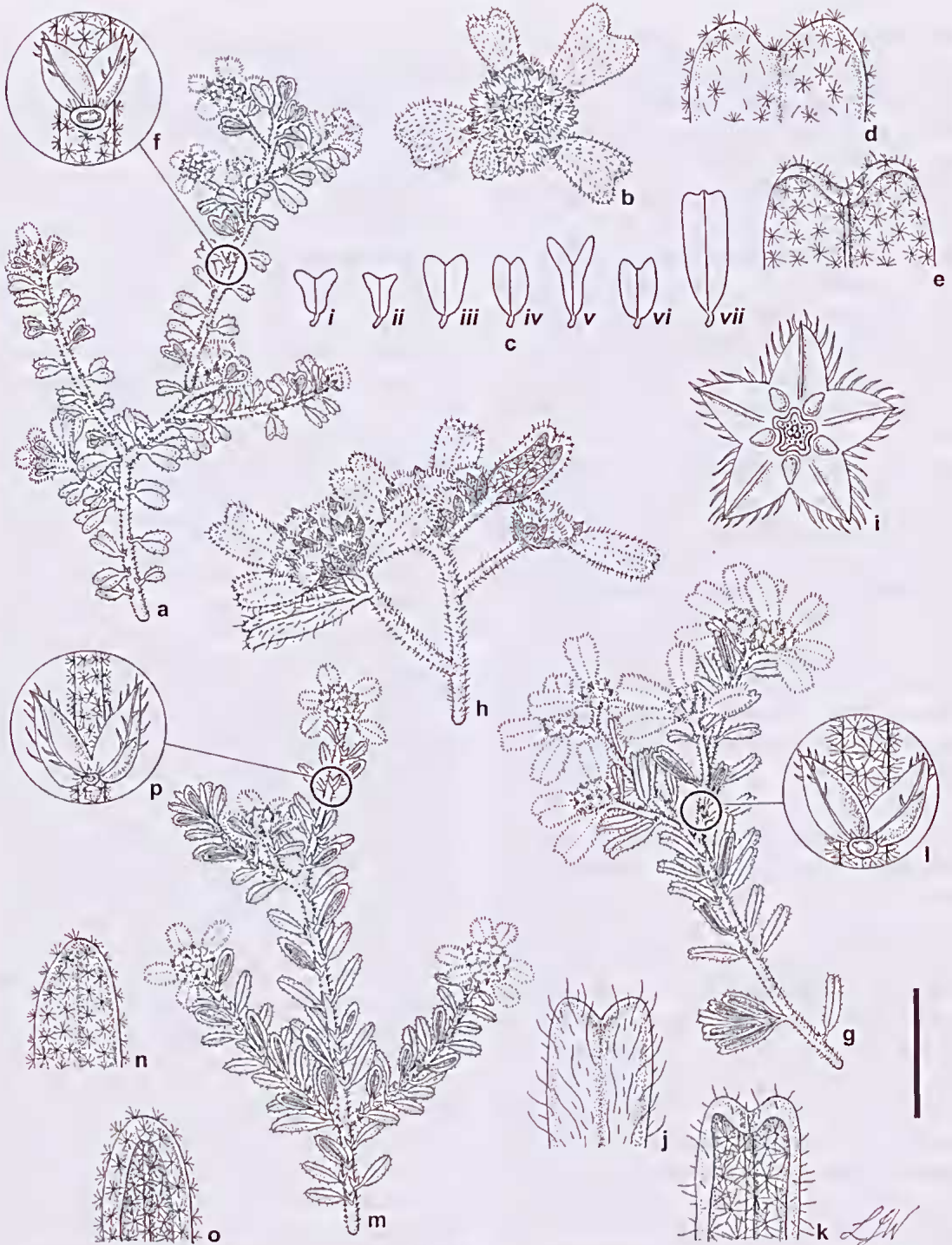


Fig. 4. a–e, *Spyridium halmaturinum*: a, habit; b, inflorescence; c, variations in leaf shape and size; d, upper surface of leaf; e, lower surface of leaf; f, stipules. g–l, *S. scabridum*: g, habit; h, inflorescence; i, flower; j, upper surface of leaf; k, lower surface of leaf; l, stipules. m–p, *S. coalitum*: m, habit; n, upper surface of leaf; o, lower surface of leaf; p, stipules. a, b, f, J. Kellermann 505 (AD 232560); c: †J. B. Cleland s.n. (AD 966090648), *P. Copley NPK1 20078 et al., †J. Kellermann 506 (AD 232570), †H. M. Cooper s.n. (AD 96521008), †B. M. Overton 1994 (AD 99232067), †F. M. Mowling 75 (AD 98238174); cⁱⁱⁱ, d, e, J. Kellermann 530 (AD 232569); g, j, k, J. Kellermann 522; h, G. Jackson 887 (AD 97206084); i, J. Kellermann 503; l, V. J. Levitzke 1189 (AD 98639053); m–p, J. Kellermann 521. Scale bar: a, g, m, 18 mm; b, h, 10 mm; c, 15 mm; d, e, j, k, m, o, 3 mm; i, 1.5 mm; f, l, 3 mm; p, 5.1 mm.

5. *Spyridium scabridum* (Tate) Kellermann & W.R.Barker, comb. nov.

Cryptandra scabrida Tate, *Trans. & Proc. Roy. Soc. S. Australia* 12: 129 (1889) & 12: 62, 94 (1889), *nomen* (see notes below); Tate, *Handb. Fl. Extratrop. S. Australia* 98 (1890). — *Spyridium halmaturinum* var. *scabridum* (Tate) J.M. Black, *Fl. S. Australia* 3: 369 (1926); ed. 2, 3: 550 (1952); E.M. Canning in Jessop & Toelken, *Fl. S. Austral.* 2: 817 (1986); W.R. Barker, *J. Adelaide Bot. Gard. Suppl.* 1: 91 (2005). — *Spyridium scabridum* Tate, *Trans. & Proc. Roy. Soc. S. Australia* 12: 129 (1889), *nom. inval. pro syn.* — *Type citation*: 'By the Eleanor River, and at Karatta, on the Stun'sailboom River, Kangaroo Island (R.T., January 24, 1883). — *Lectotype* (*designated here*): **SOUTH AUSTRALIA**. Kangaroo Island, 24 Jan. 1883, R. Tate s.n. (MEL 2104209, ex Herb. Adelaide Univ.). *Isolectotype*: Kangaroo Island, Jan 1883, [R. Tate s.n.] (MEL 2104264, right specimen). *Residual syntype*: Eleanor R., Kangaroo Island, 23 Jan. 1883, [R. Tate s.n.] (AD 98132274, ex Herb. R. Tate).

Illustrations: A. Prescott, *It's blue with five petals: Kangaroo Island field guide* 51, fig. 9 (1995), leaf only, as *S. halmaturinum* var. *scabridum*.

Erect, slender mostly single stemmed *shrubs* or *small trees* to 3 m high, very resinous, especially stipules, bracts, flowers and fruits; young stems densely villous with light brown long stellate and simple hairs, later becoming greyish; mature shrubs with foliage in upper quarter only. *Leaves* alternate: *stipules* ovate, (2–) 3–3.5 (–4.6) mm long, free, abutting or slightly overlapping, often sticking together and appearing fused due to the high resin content, reddish-brown, glabrous, some with hairs along midrib and ciliate, and/or with hairs at apex; *petiole* 1.5–2 mm long, densely long-stellate pubescent; *lamina* oblong to narrowly obovate, 5–11 mm long, 1.5–2.8 mm wide, base obtuse, margins recurved to revolute, apex slightly emarginate to bilobed with a recurved tip, upper surface greyish-green, with a sparse to medium, villous to scabrous cover of simple hairs, sometimes becoming glabrous and tuberculate (from remaining leaf-bases) when older, lower surface with dense to medium indumentum of felted stalked stellate hairs, midrib and sometimes margins with medium to dense long simple hairs, reddish brown when young. *Floral leaves* usually 4–7: obovate, 4–7.3 mm long, 2–4.3 mm wide, covered with a very dense, white felty stellate

indumentum with interspersed longer simple hairs. *Inflorescence* loose, compound, consisting of 1–several heads with cymosely arranged \pm sessile flowers, 5–12 mm diameter; *bracts* broadly ovate, 2.3–2.8 mm long, with long cilia and long hairs along midrib. *Flowers* white to cream. *Hypanthium tube* 0.5–0.7 mm long, c. 1–1.2 (–1.4) mm diameter, with sparse long simple hairs, base with long hairs. *Sepals* 0.6–0.7 (–0.9) mm long, as long as hypanthium tube, indumentum similar to hypanthium; *sepal:tube* ratio 1:1. *Petals* 0.4–0.5 (–0.6) mm long, cucullate, clawed; *limb:claw* ratio c. 4:1. *Stamens* subequal to the petals, 0.4–0.5 mm long; *anthers* c. 0.2 mm long. *Ovary* inferior, carpels 3, summit with dense erect stellate hairs; *style* (0.5–) 0.6–0.8 mm long, minutely 3-lobed. *Infructescence* slightly expanding, often breaking up into smaller unit inflorescences, tiled bracts present. *Fruits* obovoid, 1.7–2 mm long, 1.2–1.5 mm wide, dark brown to black, consisting of 3 papery fruitlets, torus apical, externally glabrous or with a few hairs; *seeds* flattened obovoid 1.2–1.4 mm long, 0.7–0.8 mm wide, light brown to yellow with black mottles and a darkened base. Fig. 4g–l, Fig. 5c.

Distribution & habitat: The taxon is endemic to Kangaroo Island, S.A., and occurs mainly in the interior of the island in heathlands, where it can become a dominant part of the overstorey, and open mallee scrubland on sand over ironstone (Fig. 2).

English name: Rough spyridium (NPWC 2003).

Phenology: Flowering in Sep.–Nov.; fruits recorded in Sep.

Notes: The species was previously treated as a variety of *S. halmaturinum*; however it is separable by its oblong leaves with recurved emarginated tip, the scabrous upper surface resulting from the deciduous stellate hairs, which are represented on older leaves by their tuberculate bases. The loose cymose inflorescences are also diagnostic, being unique in the *S. bifidum* – *S. halmaturinum* complex; they are not condensed into heads, but are more open, and similar to those of *S. waterhousei* or *S. parvifolium*. The species is very resinous and sticky, especially on bracts and stipules.

The name *C. scabrida* is mentioned in two other articles by Tate (1889a, c) that appear in the same volume of the *Trans. & Proc. Roy. Soc. S. Australia* before the description of the species, but since the whole volume was published at the same date this does not pose any



Fig 5 a, b, *Spyridium halmaturinum*: a, inflorescence surrounded by floral leaves; b, flowering branch. c, *S. scabridum*: inflorescences, open not head-like. d, *S. coalitum*: flowering branch with old infructescence (lower left). a, F. Udovicic 229 & W.R. Barker (CANB 49164); b, W.R. Barker 7521 & F. Udovicic; c, W.R. Barker 7540 & F. Udovicic (AD 172359); d, W.R. Barker 7557 & F. Udovicic. Photos by F. Udovicic (a) and W.R. Barker (b–d).

nomenclatural problems. Tate's paper on the flora of Kangaroo Island (Tate 1889c) was read to the Society on 4 Dec. 1888, eight months before his description of new species (read 1 Oct. 1889); as such, the name *C. scabrida* was well known before it appeared in print (Dec. 1889). However, no other reference to the name has been found.

Tate changed his mind about the generic placement of the species, as he quoted his manuscript name *Spyridium scabridum* in synonymy. He altered this to *Cryptandra* when the species was published, possibly under the influence of Ferdinand von Mueller, who accepted a largely expanded genus *Cryptandra* (see introduction).

Typification: Two localities are quoted by Tate in the protologue: Eleanor River and Karatta, which are c. 15 km apart. It is unclear whether both were collected on 24 Jan. 1883. All specimens from Eleanor River examined, were collected the day before. The only specimen annotated with the date given in Tate's publication, is selected as lectotype.

Conservation: The taxon is listed as 'Rare' for South Australia (NPWC 2003; Barker 2005; both as *S. halmaturinum* var. *scabridum*).

Etymology: Tate (1889b: 129) explains the use of the epithet *scabridum* as follows: "[u]pper surface of leaves somewhat rough". Although the hairs on the leaves of *S. scabridum* are better described as villous or velvety, they break off easily and the hair-bases remain as tubercles, giving the leaves a rough appearance.

Selected specimens examined (c. 65 seen): SOUTH AUSTRALIA. KANGAROO ISLAND: [Precise locality information withheld for conservation reasons] Hog Bay, 26 Sep. 1995, W.R. Barker 7516, F. Udovicic & R.M. Barker (AD); E of Borda lighthouse, 29 Sep. 1995, W.R. Barker 7545 & F. Udovicic (AD); Car park at start of Cliff Top Trail, 29 Sep. 1995, W.R. Barker 7554 & F. Udovicic (AD); Between Mt Taylor and Vivonne Bay, 10 Oct. 1992, R. Bates 29406 & R. Cox (AD, CANB, MEL, RSA, STU); Near Vivonne Bay, 2 Mar. 1926, J.B. Cleland s.n. (AD); Cape Torrens C.P., 30 June 1996, R. Davies s.n. (AD); Flinders Chase N.P. at Ravine des Casoars, 21 Nov. 1963, H. Eichler 17717 (AD, B, CANB); S of Mt Stockdale, Hundred of Newland, 3 Jan. 1966, H. Eichler 18572 (AD); Flinders Chase N.P., road to Scott Cove, 24 Aug. 1982, E.N.S. Jackson 4459 (AD, SIU, TAI, TI); South Coast Rd, 14 Oct. 2009, J. Kellermann 502 & 503 et al. (AD); Scott Cove lookout, 15 Oct. 2009, J. Kellermann 522 & 523 (AD); Mt Taylor, NW of Vivonne Bay, 19 Sep. 1962, T.R.N. Lothian 997 (AD); West Bay Track, Flinders Chase N.P., 5

Oct. 1994, B.M. Overton 2466 (AD); Sandy Creek, 17 Jan. 1984, E.P. Shore 38 (AD); South Coast Rd, 28 Sep. 1995, F. Udovicic 241 (CANB); Scott Cove lookout, 29 Sep. 1995, F. Udovicic 248 (AD, CANB, MEL).

6. *Spyridium coalitum* Kellermann & W.R. Barker, *nom. & stat. nov.*

Spyridium halmaturinum var. *integrifolium* J.M. Black, *Trans. & Proc. Roy. Soc. S. Australia* 49: 273 (1925). J.M. Black, *Fl. S. Australia* 3: 369 (1926); ed. 2, 3: 550 (1952); E.M. Canning in Jessop & Toelken, *Fl. S. Austral.* 2: 817 (1986); W.R. Barker, *J. Adelaide Bot. Gard. Suppl.* 1: 91 (2005). — *Type citation:* 'Kangaroo Island'. — *Lectotype (designated here):* SOUTH AUSTRALIA. Telegraph line near Harvey's Return, Kangaroo Island, Oct. 1908, H.H.D. Griffith s.n. (AD 98132270, ex Herb. J.M. Black).

Illustrations: A. Prescott, *It's blue with five petals: Kangaroo Island field guide* 51, fig. 9 (1995), leaf only, as *S. halmaturinum* var. *integrifolium*.

Erect, slender *shrubs* to 2 m high, resinous, especially stipules and bracts; young stems densely pubescent with rusty to light brown stellate and simple hairs, later becoming greyish. *Leaves* alternate: *stipules* broadly triangular to ovate, 2.5–3.6 mm long, fused for about half of their length, reddish-brown, glabrous, sometimes hairs along midrib and at apex; *petiole* 1.8–2.2 mm long, densely stellate pubescent; *lamina* oblong to narrowly elliptic, (4.5–) 6–9.5 (–15) mm long, 2.1–2.5 (–4) mm wide, base obtuse to cuneate, margins revolute, apex entire, obtuse, slightly recurved, upper surface greyish-green, with a sparse to dense cover of stellate hairs, sometimes also simple or bifid hairs, becoming glabrous and tuberculate (from remaining leaf-bases) when older, lower surface with dense to medium dense indumentum of stalked stellate hairs, midrib also with long simple hairs. *Floral leaves* usually 4–7: ovate to broadly elliptic, 4–7.3 (–10) mm long, 2.5–4 (–6) mm wide, covered with a very dense, white felty stellate indumentum with interspersed longer simple hairs. *Inflorescence* a head of cymosely arranged ± sessile flowers, 5–13 mm diameter; *bracts* in fused pairs, broadly ovate, c. 2.3 mm long, with long cilia and hairs along midrib. *Flowers* white to cream. *Hypanthium tube* c. 0.5 mm long, 0.8–1.1 mm diameter, with sparse long flexuose simple and stellate hairs, base with long hairs. *Sepals* c. 0.6 mm long, about

Key to subspecies

1. Leaf lamina Y-shaped, cuneate to obcordate, deeply emarginate **7a. subsp. bifidum**
 1: Leaf lamina narrowly oblanceolate or narrowly oblong or linear, entire, rarely emarginate at apex..... **7b. subsp. wanillae**

as long as hypanthium tube, with an indumentum of mainly short simple hairs; sepal: tube ratio 1.2:1. *Petals* (0.3–) 0.4–0.5 mm long, cucullate, clawed; limb: claw ratio c. 2:1. *Stamens* subequal to the petals, c. 0.4 mm long; *anthers* c. 0.2 mm long. *Ovary* inferior, carpels 3, summit with dense erect stellate hairs; *style* 0.5–0.8 mm long, minutely 3-lobed. *Infructescence* expanding as it matures, so tiled bracts are visible. *Fruits* ellipsoid to obovoid, c. 2.5 mm long, 1.5–1.8 mm wide, dark brown, consisting of 3 papery fruitlets, torus apical, externally \pm glabrous; *seeds* flattened obovoid 1.4–1.6 mm long, 1–1.1 mm wide, light brown with black mottles and a darkened base. Fig. 4m–p, Fig. 5d.

Distribution & habitat: The taxon is endemic to Kangaroo Island, S.A., and occurs mainly along the northwest coast near Cape Borda with a few scattered records further inland. It grows in coastal mallee heath, shrubland and eucalypt forests in shallow sand over limestone and on limestone cliffs; few records are from ironstone (Fig. 2).

English name: Flinders Chase spyridium (Biological Survey 2004).

Phenology: Flowering in Sep.–Nov.; fruits recorded in Sep.

Affinities: The species was previously a variety of *S. halmaturinum*. Important characters that distinguish *S. coalitum* are simple leaves, fused stipules and the dense indumentum on the ovary surface.

Notes: Although stellate hairs are usually present on the upper leaf-surface of *S. coalitum*, some specimens also have simple or bifid hairs.

Typification: Only one specimen of this taxon is known from Black's herbarium at AD. This is here designated as the lectotype.

Conservation: Most populations of the species are in Flinders Chase National Park or the Ravines des Casoars Wilderness Protection Area, and are well conserved.

Etymology: The epithet is derived from the Latin *coalitus*, united by growth, in reference to the stipules of the species that are united and fused together for about half of their length. This is in contrast *S. halmaturinum*, which has free stipules.

Selected specimens examined (40 seen): SOUTH AUSTRALIA. KANGAROO ISLAND: Snug Cove, 2 Nov. 1986, R.J. Bates 7701 (AD); Flinders Chase N.P., West Coast Rd, c. 3.5 km by road N of West Bay turnoff, c. 3 km direct NE of West Bay, 7 Oct. 1982, W.R. Barker 4500 & L. Haegi (AD, MEL); Cape Borda Lighthouse; 50–100 m W of houses, 29 Sep. 1995, W.R. Barker 7543 & F. Udovicic (AD); 100 m W of Scott Cove lookout, 29 Sep. 2995, W.R. Barker 7557 & F. Udovicic (AD); 0.9 km WSW of Cape Borda Lighthouse, 8 Nov. 1989, D. Canty & G. Ashman NP/1 10085 (AD); Flinders Chase, 2 Feb. 1948, J.B. Cleland s.n. (AD); Flinders Chase N.P., clay pan c. 4 km ESE by road from car park at West Bay, more NW of 2 clay pans in area, 23 Aug. 1982, E.N.S. Jackson 4432 (AD, IBSC, LJU, LSU); Cape Borda, Cliff Top Hike N of lighthouse, 15 Oct. 2009, J. Kellermann 519–521 (AD); Cape Borda, 29 Aug. 1964, M.E. Phillips 420 (AD, CBG, L); 8 miles [12.8km] from Rocky River, SE towards Cape Borda, 29 Sep. 1965, M.E. Phillips 1017 (CANB, MEL); 2.65 km SW of Snug Cove, 10 Nov. 1989, A. Robinson & C. Halstead NP/1 10181 (AD); 1 km E of Snake Lagoon, 7 Nov. 1989, A. Robinson & C. Halstead NP/1 10620 (AD, MEL); Flinders Chase, c. 24 km along the West Bay Track from Rocky River Homestead, 21 Oct. 1968, J.R. Wheeler 1300 (AD).

7. *Spyridium bifidum* (F.Muell.) F.Muell. ex Benth., Fl. Austral. 1: 432 (1863).

M.R.Schomb., *Fl. S. Australia* 37 (1875); F.Muell., *pro parte; Fragm.* 9: 136 (1875), *pro parte*; Tate, *Trans. & Proc. Rep. Roy Soc. South Australia* 3: 66 (1880), *pro parte*; J.M.Black, *Fl. S. Australia* 3: 369 (1926), *pro parte*; ed. 2, 3: 550 (1952), *pro parte*; E.M.Canning in Jessop & Toelken, *Fl. S. Austral.* 2: 817 (1986), *pro parte*; W.R.Barker, *J. Adelaide Bot. Gard. Suppl.* 1: 90 (2005), *pro parte*. — *Trymalium bifidum* F.Muell., *Defin. Austral. Pl.* 42 (1855); *Trans. & Proc. Victorian Inst. Advancem. Sci.* 1: 121 (1855); Hooker's *J. Bot. & Kew Gard. Misc.* 8: 40 (1856). — *Trymalium bifidum* F.Muell. *emend. Reissek, Linnaea* 29: 282 (1858). — *Cryptandra bifida* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 61 (1882), *pro parte*. *Second Syst. Census Austral. Pl.* 104 (1889), *pro parte*; Tate, *Trans. & Proc. Rep. Roy. Soc. South Australia* 12: 94 (1889), *pro parte*; *Handb. Fl. Extratrop. S. Australia* 98 (1890), *pro parte*. — *Type citation:* 'In the Marble Ranges and on the coast of Spencer's Gulf, at Boston Point. C. Wilhelmi'. — *Lectotype (here designated):*

SOUTH AUSTRALIA. Marble Range, *C. Wilhelmi* s.n. (MEL 233423, ex Herb. Sonder; sterile material). *Residual syntypes*: "Marble Range & Port Lincoln, 1855", *C. Wilhelmi* s.n. (K, sterile specimen with loan stamp H/1310/95 22/76); "Boston Pt. Marble Ra.", *C. Wilhelmi* s.n. (K 356451 n.v., photo at MEL 2264224, ex Herb. F.Muell., left hand specimen); "Boston Point, in montib. sicc. humil., florifer!" [in low, arid hills, flowering], *C. Wilhelmi* s.n. (MEL 233422); "Boston Point", *C. Wilhelmi* s.n. (BM 793990 n.v., photo at MEL 2264225, right hand specimen); all types of *Trymalium stenophyllum* Reissek (see below). *Epytype* (here designated): **SOUTH AUSTRALIA.** Marble Range, E of N/S Block Saddle, very close to road junction at base of road across saddle, Eyre Peninsula, S.A., B Oct. 1995. *W.R. Barker 7601 & R.M. Barker* (AD 173237). *Isoeptypes*: B, BM, BRI, CANB, MEL, MO, NSW, NT, NY, PERTH, SI, US, W.

Erect shrubs to 2 m high, not resinous; young stems densely pubescent with intertwined stellate and simple hairs. *Leaves* alternate: *stipules* triangular to narrowly ovate, (1.4–) 1.8–3 mm long, fused for 1/2 to 3/4 of their length, ciliate towards apex, midrib with long simple hairs, glabrescent with age; *petiole* 0.7–1.5 (–1.7) mm long, densely stellate pubescent, soon glabrous; *lamina* 3.2–13 mm long, 1–5 mm wide, base cuneate, margins \pm revolute, upper surface green, covered with a medium dense white to greyish indumentum of long antrorse simple hairs, lower surface sparsely to densely covered with small stalked stellate hairs, midrib also with simple antrorse hairs. *Floral leaves* usually 5–8: broader than stem leaves, 3–10 mm long, 1.5–6 mm wide, covered with a very dense, white felted indumentum. *Inflorescence* a dense globular head of cymosely arranged \pm sessile flowers, 8–12 mm diameter; *bracts* in fused pairs, ovate to broadly ovate, 1.7–3 mm long, with long cilia. *Flowers* white, covered in dense long simple hairs overlying fewer stellate hairs. *Hypanthium tube* 0.6–0.8 mm long, 1.4–2 mm diameter, tube sparsely to moderately dense pubescent with simple hairs, base densely pubescent with short stellate and overlying long simple hairs. *Sepals* 0.7–0.9 mm long, with dense tufts of simple hairs at apices. *Petals* 0.4–0.6 mm long, cucullate, clawed. *Stamens* subequal to the petals, 0.5–0.7 mm long; *anthers* 0.2–0.3 mm long. *Ovary* inferior, carpels 3, summit densely pubescent with stellate hairs; *style* 0.6–0.8 mm long, stigma 3-lobed.

Infructescence not or hardly expanding. *Fruits* obovoid, 2.2–2.5 mm long, 1–1.4 mm wide, light brown, consisting of 3 papery fruitlets, of which usually only one develops fully, torus \pm apical, fruit wall densely pubescent; *seeds* flattened obovoid, 1.4–1.7 mm long, 0.8–1 mm wide, light brown with a darkened base.

Distribution & habitat: The species consists of two subspecies which occur on Marble Range and the hills east of Edillilie, Eyre Peninsula, S.A., their ranges of distribution only 5–6 km apart. Habitat is summarised under the subspecies.

Affinities: It is closely related to *S. stenophyllum*, which differs in having narrower leaves, smaller flower heads, an ovary with two carpels and a style with two stigmatic lobes. Also possibly allied is *S. leucopogon*, an entire-leaved species that occurs further to the south on the coast of Eyre Peninsula. It has shorter habit, smaller heads and smaller leaves with a recurved apex. This relationship is being investigated in broader revisional studies.

Typification: The typification of this species is complex. When Mueller published *T. bifidum*, he also included material of the taxon now known as *S. stenophyllum*. He quotes specimens from Marble Range and Boston Point, two localities about 45 km apart. In our concept of the species, *S. bifidum* is endemic to the Marble Range region and the taxon from Boston Point is *S. stenophyllum*. However, there are specimens of *S. bifidum* labelled as coming from "Marble Ra." and "Boston Pt". On one sheet, a single twig is labelled as coming from Marble Range and Port Lincoln at the same time. Another sheet has one label "Boston Point Marble Range" with two specimens, one each of *S. bifidum* and *S. stenophyllum*. Hence, we assume that collections of the taxon labelled as coming from Boston Point are labelled wrongly. Since Mueller thought that the specimens from the two localities were the one species, they were most likely mixed up when he sent them out to other herbaria.

We designate the only sheet unambiguously labelled as from Marble Range as the lectotype of *S. bifidum*. All other sheets have either Boston Point as collecting locality or both Boston Point and Marble Range. Unfortunately the lectotype is a sterile specimen. Apart from leaf shape and indumentum, the number of carpels and stigma lobes is an important character

to distinguish between *S. stenophyllum* and *S. bifidum*. Since the lectotype does not have any flowers, a recently collected flowering specimen is designated as epitype to clearly fix the name *S. bifidum*.

Etymology: The epithet is Latin and refers to the forked leaves of the species.

7a. *Spyridium bifidum* subsp. *bifidum*

Spyridium bifidum var. *Marble Range* (W.R.Barker 7601)
W.R.Barker, *J. Adelaide Bot. Gard. Suppl.* 1: 90 (2005).

Slender, erect *shrubs* to 2 m high, not resinous; young stems densely pubescent with white dense intertwined stellate and simple hairs, later becoming greyish. *Leaves* alternate: *stipules* triangular to narrowly ovate, (1.5–) 2–3 mm long, fused for 1/2 to 3/4 of their length, ciliate towards apex, midrib with long simple hairs, glabrescent with age; *petiole* 0.7–1.5 (–1.7) mm long, densely stellate pubescent, soon glabrous; *lamina* Y-shaped, cuneate to narrowly obcordate, 3.2–10 mm long, 1.9–5 mm wide, base cuneate, margins \pm revolute, apex deeply emarginate for up to 1/2 of leaf's length, upper surface green, covered with a medium dense white to greyish indumentum of long antrorse simple hairs, lower surface sparsely to densely covered with small stalked stellate hairs, midrib also with simple antrorse hairs. *Floral leaves* usually 5–8: broader than stem leaves, 3–10 mm long, 2.2–6 mm wide, covered with a very dense, white felted stellate indumentum. *Inflorescence* a dense globular head of cymosely arranged \pm sessile flowers, (8–) 10–12 (–15) mm diameter, often several heads are crowded together and appear even larger; *bracts* in fused pairs, ovate to broadly ovate, 1.7–3 mm long, with long cilia, long hairs along midrib, and fewer hairs outside. *Flowers* white, covered in dense long simple hairs overlying fewer stellate hairs. *Hypanthium tube* 0.6–0.8 mm long, (1.5–) 1.7–2 mm diameter with sparse simple hairs, base densely pubescent with short stellate and overlying long simple hairs. *Sepals* 0.7–0.9 mm long, about as long as hypanthium tube, with dense tufts of simple hairs at apices; sepal:tube ratio 1:1.2. *Petals* 0.5–0.6 mm long, cucullate, long-clawed; limb:claw ratio c. 2:1. *Stamens* subequal to the petals, c. 0.6 mm long; *anthers* 0.2–0.3 mm long. *Ovary* inferior, carpels 3, summit densely pubescent with stellate hairs; *style* 0.7–0.8 mm long, stigma 3-lobed. *Infructescence* globular, expanding up

to 20 mm diam.; bracts not tiled. *Fruits* obovoid, 2.4–2.5 mm long, 1.2–1.4 mm wide, light brown, consisting of 3 papery fruitlets, of which usually only one develops fully, torus \pm apical, fruit wall densely pubescent; seeds flattened obovoid, 1.6–1.7 mm long, c. 1 mm wide, light brown with a darkened base. Fig. 6a–e., Fig. 8a–b.

English name: Marble Range spyridium (NPWC 2003).

Distribution & habitat: The typical subspecies is endemic to the Marble Range, Eyre Peninsula (Fig. 2), where it occurs in open mallee shrubland on quartzite and sometimes on sand over laterite.

Phenology: Flowering in June–Sep.; fruits recorded in Oct.

Notes: Black (1926, 1952) recognised the distinctiveness of Marble Range populations, referring to it as the "large leaved form of *S. bifidum* from Marble Range".

Conservation: The taxon is restricted to a localised line of hills, the Marble Range. It is listed as 'Vulnerable' in South Australia (NPWC 2003, Barker 2005; as *S. bifidum* var. *Marble Range*).

Selected specimens examined (30 seen): SOUTH AUSTRALIA. EYRE PENINSULA: [Precise locality information withheld for conservation reasons] N Block of Marble Range, 26 Jun. 1966, A. Ainslie s.n. (AD); Marble Range, Hundred of Warrow, 25 Aug. 1967, C.R. Alcock 1401 (AD); Population nearest top of saddle of N/S blocks, 8 Oct. 1995, W.R. Barker 7602 & R.M. Barker (AD); E of Marble Range, Sep. 1982, R.J. Bates 2284 (AD); W of Edillillie, 26 Oct. 1988, D. Hopton 243 (AD, CANB); SSE of Coultia, Site: BS128-MAR00601, Patchid: 20218, 9 Sep. 2004, P.J. Lang, P.D. Canty & R.S. Johnson BS128-3156 (AD); Marble Ra., E face, 30 Sep. 1979, D.E. Symon 11665 (AD, BH, LG); Marble Ra., 30 Sep. 1979, J.Z. Weber 6029 (AD, CAL, DUH); 6 km W of Edillillie, 15 June 1975, L.D. Williams 6694 (AD).

7b. *Spyridium bifidum* subsp. *wanillae* Kellermann & W.R.Barker, *nom. & stat. nov.*

Spyridium bifidum var. *integrifolium* J.M. Black, *Trans. & Proc. Roy. Soc. S. Australia* 49: 273 (1925), J.M. Black, *Fl. S. Australia* 3: 369 (1926); ed. 2, 3: 550 (1952); E.M. Canning in Jessop & Toelken, *Fl. S. Austral.* 2: 817 (1986). — *Type citation:* 'Port Lincoln to Marble Range, E.P.' — *Lectotype* (here designated): SOUTH AUSTRALIA. Port Lincoln, 10 Oct. 1909, H.H.D. Griffith s.n. (AD 96820287, ex Herb. J.M. Black). *Isolectotype:* MEL 2104812 [J.M. Black 12]. *Residual syntype:* Marble Range, s.coll. (AD 97610493, ex Herb. R. Tate, determined by J.M. Black).

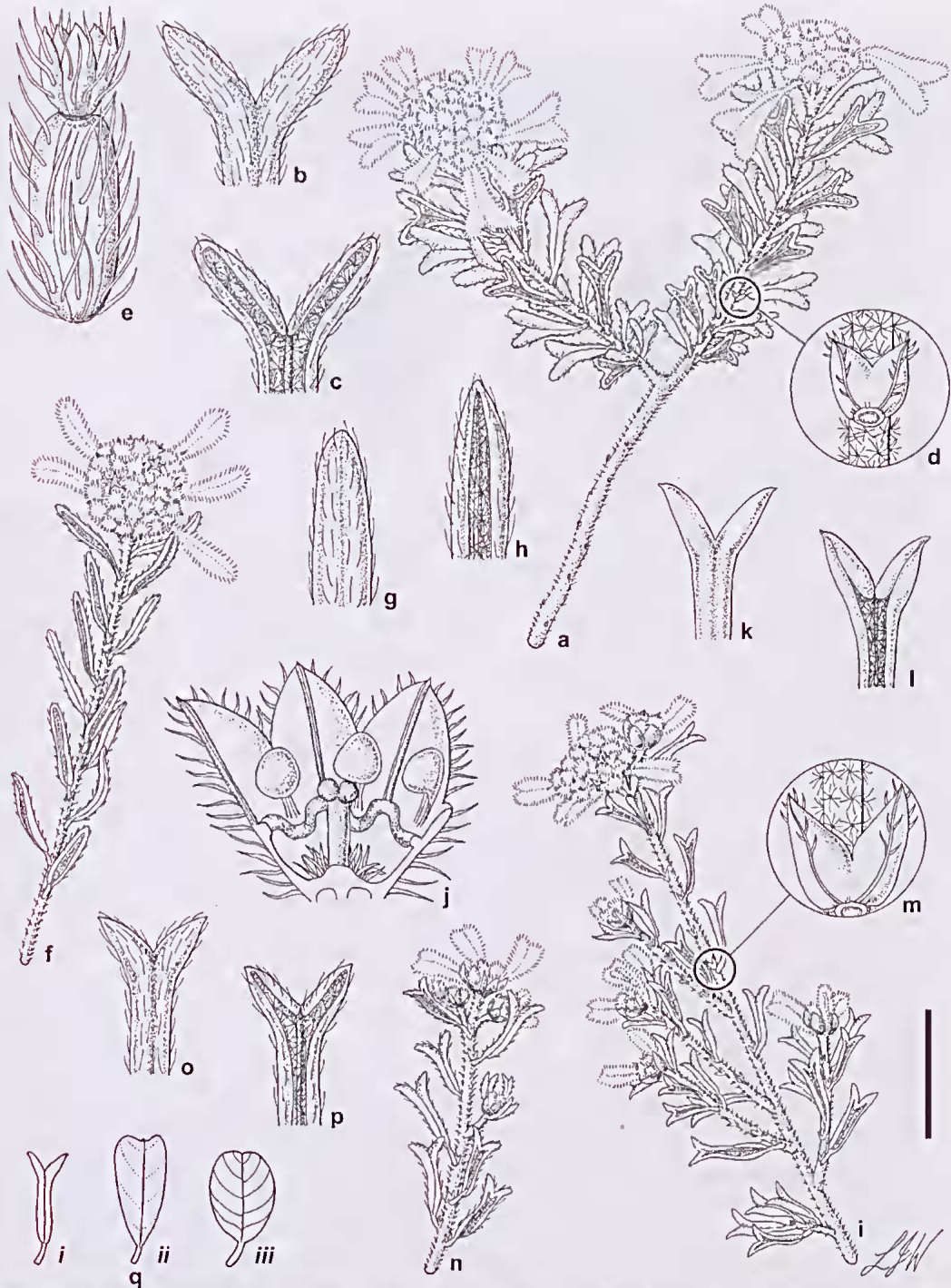


Fig. 6. a–e, *Spyridium bifidum* subsp. *bifidum*: a, habit; b, upper surface of leaf; c, lower surface of leaf; d, stipules; e, fruit. f–h, *S. bifidum* subsp. *wonilloe*: f, habit; g, upper leaf surface; h, lower leaf surface. i–m, *S. stenophyllum* subsp. *stenophyllum*: i, habit; j, part of flower with 2-fid stigma; k, upper surface of leaf; l, lower surface of leaf; m, stipules. n–p, *S. stenophyllum* subsp. *renovotum*: n, habit; o, upper surface of leaf; p, lower surface of leaf. q, Example of hybridisation (leaf shape and venation): ⁱ*S. stenophyllum* subsp. *renovotum*, ⁱⁱpresumed hybrid, ⁱⁱⁱ*S. porvifolium*. a, D.J.E. Whibley 1B74 (AD 96740055); b–d, P.J. Lang et al. BS128-3156; e, W.R. Barker 7603; f–h, W.R. Barker 7591 (AD 173226); i, D.J.E. Whibley 5757; j–m, F.J. Bodman 11156; n–p, q ⁱJ. Kellermann 471 et al.; q ⁱⁱJ. Kellermann 467 (AD 232470), ⁱⁱⁱJ. Kellermann 469 (AD 232472). Scale bar: a, f, i, n, 13.8 mm; b, c, g, h, k, l, o, p, 3 mm; d, m, 3 mm; e, j, 1.5 mm; q, 9.6 mm.



Fig. 7. Lectotype of *Spyridium stenophyllum* (Reissek) Kellermann & W.R.Barker (MEL 233425, part of sheet). The determinavit slips were written by F. von Mueller (original determination with his 1855 name: '*Trymalium bifidum* / FerdMueller / Boston Point / Wilhelmi'; bottom label), S. Reissek (after splitting this species from *T. bifidum* in 1858: '*Trymalium stenophyllum* Reiss. et Müll. / (*T. bifidum* F.Müll ex parte) / R.; top label) and G. Bentham, during the preparation of *Flora Australiensis* (early 1860s, Rhamnaceae was published 1863, using the unpublished name '*Spyridium stenophyllum*'; middle label).

Key to subspecies

1. Leaves: upper surface glabrous; leaf-lobes mucronate, apex recurved 8a. subsp. *stenophyllum*
 1: Leaves: upper surface with simple, antrorse hairs; leaf-lobes ± obtuse, apex hidden
 by a tuft of hairs 8b. subsp. *renovatum*

Spyridium bifidum var. *Wanilla* (K. Clipstone 88)
 W.R.Barker in Jessop, *List Vasc. Pl. S. Austral.*, ed. 4, 55
 (1993). W.R.Barker, *J. Adelaide Bot. Gard. Suppl.* 1: 90
 (2005).

Erect shrubs to 2 m high, not resinous; young stems densely pubescent with white (very rarely rusty) intertwined stellate and simple hairs, later becoming greyish. Leaves alternate: stipules triangular, (1.4–) 1.8–3 mm long, fused for 1/2 to 3/4 of their length, ciliate towards apex, outside with long simple hairs, especially along midrib, glabrescent when older (sometimes also when young); petiole 1–1.5 mm long, densely stellate pubescent, soon glabrous; lamina narrowly oblanceolate or narrowly oblong or linear, 5–13 mm long, 1–1.5 (–2) mm wide, base cuneate, margins revolute, apex entire, obtuse to apiculate, rarely emarginate or 2-lobed, upper surface green, covered with a medium dense white to greyish indumentum of antrorse simple hairs, lower surface sparsely to densely covered with small stellate hairs, midrib also with simple antrorse hairs. Floral leaves usually 5 or 6: broader than stem leaves, 5–7 mm long, 1.5–2 mm wide, covered with a very dense, white felted indumentum of stellate and longer simple hairs. Inflorescence a dense globular head of cymosely arranged ± sessile flowers, 8–12 mm diameter; bracts in fused pairs, ovate to broadly ovate, 2–3 mm long, with long cilia, rarely hairs along midrib, and fewer hairs outside. Flowers white, covered in dense long simple hairs overlying fewer stellate hairs. Hypanthium tube 0.6–0.8 mm long, 1.4–1.6 mm diameter with sparse to moderately dense simple hairs, base densely pubescent with short stellate and overlying long simple hairs. Sepals 0.7–0.8 mm long, about as long as hypanthium tube, with dense tufts of simple hairs at apices; sepal: tube ratio 1:1–1.2. Petals 0.4–0.6 mm long, cucullate, long-clawed; limb: claw ratio c. 5:2. Stamens subequal to the petals, 0.5–0.7 mm long; anthers 0.2–0.3 mm long. Ovary inferior, carpels 3, summit densely pubescent with stellate hairs; style 0.6–0.8 mm long,

stigma 3-lobed. Infructescence not or hardly expanding. Fruits obovoid, c. 2.2 mm long, 1–1.2 mm wide, light brown, consisting of 3 papery fruitlets, of which usually only one develops fully, torus ± apical, fruit wall densely pubescent; seeds flattened obovoid, 1.4–1.5 mm long, c. 0.8 mm wide, light brown with occasional black mottles and a darkened base. Fig. 6f–h, Fig. 8c.

English name: *Wanilla spyridium* (NPWC 2003).

Distribution & habitat: This taxon occurs in the area around *Wanilla*, Eyre Peninsula (Fig. 2). It grows in mallee shrubland with *Eucalyptus incrassata* Labill. and *Melaleuca uncinata* R.Br. on sand over laterite and ironstone.

Phenology: Flowering in July; fruits recorded in Oct.

Notes: Black described this taxon as *S. bifidum* var. *integrifolium* from the Eyre Peninsula, and cited this locality also in his *Flora of South Australia*. In her treatment of *S. bifidum* var. *integrifolium* Canning (1986) cites Kangaroo Island as the area of occurrence. This error was perpetuated in several other publications (e.g. Barker 2005). It is not clear to which taxon Canning applied the name, but the entire-leaved species from Kangaroo Island referred to is most likely *S. coalitum*, *S. vexilliferum* or other similar species.

Hairs on the upper surface of the leaves are usually longer in subsp. *wanillae* than in subsp. *bifidum*; one specimen has near-glabrous leaves (Bates 37251). Rarely, some flowers of a specimen display two stigmatic lobes (Udovicic 294, CANB 480356).

Occasionally flowers of subsp. *wanillae* have only a rudimentary style or rudimentary stamens.

There are also presumed hybrids with *S. vexilliferum*, where both species co-occur; these plants show intermediate characters between the two taxa (e.g. Barker 7588 & 7589, Udovicic & Barker, AD 173223 & AD 173224).

The Marble Range location of *Smyth 2* needs confirmation. It is the location of subsp. *bifidum* and the two subspecies are otherwise allopatric on ranges a few kilometres apart on either side of a broad valley. A confusion of localities could easily have arisen.

Typification: A specimen with Black's annotations from his herbarium at AD is selected as lectotype. On this sheet he notes that a duplicate of this collection was forwarded by him to A.J. Ewart in Melbourne as "no. 12"; this specimen is now at MEL. A specimen labelled as "Marble Ra." is a residual syntype, which was presumably collected more at the S end of the Range, towards Wanilla.

Conservation: The taxon is listed as 'Vulnerable' in South Australia, with some populations reserved in Wanilla Conservation Park (NPWC 2003, Barker 2005; as *S. bifidum* var. *Wanilla*).

Etymology: The epithet refers to the location of the taxon, Wanilla, which is applied to the Hundred¹ and one of the towns to the west. It is treated as a noun in genitive form.

Selected specimens examined (22 seen): SOUTH AUSTRALIA. EYRE PENINSULA: [Precise locality information withheld for conservation reasons] E of township of Wanilla, NW of Port Lincoln, Hundred of Wanilla, 6 July 1965, C.R. Alcock s.n. (AD); Nicho's Nooky, 8 Oct. 1995, W.R. Barker 7604 & R.M. Barker (AD); Wanilla C.P., 7 Oct. 1995, W.R. Barker 75B6, F. Udovicic & R.M. Barker (AD); Hills S of Ungarra, 19 July 1994, R. Botes 37251 (AD, MEL); W of Wanilla, 1 June 1982, K. Clipstone BB (AD); Adjacent Wanilla C.P., 26 Oct. 1989, D. Hopton 232–234 (AD, CANB); "E side of Marble Ra.," Oct. 1993, J. Smyth 2 (AD); Wanilla–North Shields Rd, 3 Mar. 1993, N.G. Walsh 4002 (AD, MEL); E of Wanilla, 30 Aug 1976, D.J.E. Whibley 5712 (AD, UWM).

8. *Spyridium stenophyllum* (Reissek) Kellermann & W.R.Barker, *comb. nov.*

Trymalium stenophyllum Reissek, *Linnaea* 29: 282 (1858). — Type citation: '8oston Point (Wilhelmi).'. — Lectotype (*here designated*): SOUTH AUSTRALIA. 8oston Point, C. *Wilhelmi* s.n. (MEL 233425, ex Herb. Reissek; Fig. 5). Isolectotype: MEL 233426 (ex Herb. Sonder). Residual syntypes: "8oston Point Marble Range", C. *Wilhelmi* s.n. (K 356451 n.v., photo at MEL 2664224, right hand specimen); "Marble Range", C. *Wilhelmi* s.n. (8M 793990 n.v., photo at MEL 2264225, left hand specimen); "Marble Ra.", C. *Wilhelmi* s.n. (MEL 233424).

Spyridium bifidum auct. non (F.Muell.) F.Muell. ex Benth.: Benth., *Fl. Austral.* 1: 432 (1863); Schomb., *Fl.*

S. Austral. 37 (1875); Tate, *Trans. & Proc. Roy. Soc. South Australia* 3: 66 (1880); J.M.Black, *Fl. S. Australia* 3: 369 (1926), *pro parte*, ed. 2, 3: 550 (1952), *pro parte*; E.M.Canning in Jessop & Toelken, *Fl. S. Austral.* 2: 815 (1986), *pro parte*; W.R.Barker, *J. Adelaide Bot. Gard. Suppl.* 1: 90 (2005), *pro parte*.

Cryptandra bifida auct. non (F.Muell.) F.Muell.: F.Muell., *Syst. Census. Austral. Pl.* 61 (1882), *pro parte*. *Second Syst. Census Austral. Pl.* 104 (1889), *pro parte*; Tate, *Trans. & Proc. Roy. Soc. South Australia* 12: 94 (1889), *pro parte*; Tate, *Handb. Fl. Extratrop. S. Australia* 98 (1890), *pro parte*.

Shrubs to 1.2 m high, resinous; young stems densely pubescent with stellate hairs, especially on young stipules and bracts. *Leaves* alternate; *stipules* triangular to narrowly ovate, 2–3.8 (–6) mm long, fused for more than half of their length, reddish-brown, glabrous, with hairs along midrib and cilia towards apex; *petiole* 0.9–2.2 mm long, glabrous to sparsely pubescent; *lamina* narrowly Y-shaped to narrowly cuneate, (3.4–) 3.8–7.5 (–9.5) mm long, 1.2–2.8 mm wide, base cuneate, margins revolute, apex deeply to shallowly emarginate or bilobed, upper surface green, lower surface with dense to medium dense indumentum of stellate hairs, midrib with long simple hairs. *Floral leaves* usually 3–5: broader than stem-leaves, 3.2–7 mm long, 1.6–2.8 mm wide, covered with a very dense, white felty stellate indumentum, often interspersed longer simple hairs. *Inflorescence* a globular head of cymosely arranged ± sessile flowers, 6–11 (–12) mm diameter; *bracts* in fused pairs, broadly ovate, 2–3 mm long, with long cilia. *Flowers* white to cream. *Hypanthium tube* 0.4–0.5 (–0.8) mm long, (1.2–) 1.4–1.7 mm diameter, tube pubescent or glabrous, base densely pubescent with short stellate and overlying long hairs, often flexuous. *Sepals* 0.5–1 mm long with an indumentum of mainly short simple or stellate hairs, especially towards tip. *Petals* 0.4–0.7 (–0.8) mm long, cucullate, clawed. *Stamens* subequal to the petals, 0.3–0.6 mm long; *anthers* c. 0.2 mm long. *Ovary* inferior, carpels 2, summit with dense stellate hairs; *style* 0.6–0.8 (–1) mm long, minutely bilobed. *Infructescence* slightly expanding, but no tiled bracts visible. *Fruits* obovoid to ellipsoid, 1.7–2 mm long, 1.3–1.5 mm wide, light brown, consisting of 1–2 papery fruitlets, torus apical, fruit wall densely pubescent; *seeds* 1–1.4 mm long, 0.8–1 mm wide, brown with a darkened red-brown base.

1. S.A. is traditionally divided into Counties, Hundreds and Sections (see Landbeater 2006–).

Distribution & infraspecific variation: The species has two subspecies, which occur throughout most of Eyre Peninsula and adjacent regions further east.

Affinities: The species is closely related to *S. bifidum*, which differs in having slightly broader leaves that are always covered with antrorse simple hairs, larger flower heads, an ovary with three carpels and a style with three stigmatic lobes.

Notes: This species is the only species in the genus *Spyridium* with two carpels and a bilobed style. Usually only one carpel matures, resulting in a one-seeded fruit. It is one of a few species of Pomaderreae with bilocular ovaries, the other taxa being the genus *Polianthion* K.R.Thiele (Kellermann *et al.* 2006), several species of *Cryptandra* (Rye 1995a, 2008) and the typical subspecies of *Trymalium odoratissimum* Lindl. (Rye 1995b,



Fig 8. a,b, *Spyridium bifidum* subsp. *bifidum*: a, inflorescence surrounded by floral leaves; b, flowering branch; c, *S. bifidum* subsp. *wanillae*: inflorescence. d, *S. stenophyllum* subsp. *renovatum*: branches with old infructescence (upper right). a, b, W.R. Barker 7601 & R.M. Barker; c, W.R. Barker 7586 *et al.*; d, J. Kellermann 471 *et al.* Photos by W.R. Barker (a–c) and J. Kellermann (d).

as *T. floribundum* Steud.; Kellermann et al. 2008).

Typification: The typification of *S. stenophyllum* is closely linked with that of *S. bifidum*. Reissek split Mueller's *T. bifidum* into two species: specimens from Marble Range retained the name *T. bifidum*, while specimens from Boston Point were described as a new taxon, *T. stenophyllum*. There are no syntypes of the taxon at W, where Reissek's original herbarium is deposited (E. Vitek, pers. comm., Jan. 2008), but MEL has a sheet from Reissek's herbarium (Fig. 7), which is labelled by Mueller as *T. bifidum* and by Reissek as *T. stenophyllum*. This specimen is designated as lectotype. Another small specimen at MEL from the Sonder Herbarium is an isolectotype.

The lectotype also has a label by Bentham, who examined Mueller's herbarium for preparation of *Flora Australiensis*. He already recognised that the species belonged to *Spyridium* and labelled it as '*Spyridium stenophyllum*', although in his flora treatment he subsumed the taxon into *S. bifidum* (Bentham 1863). As such Bentham was the first person to — albeit not formally — consider combining the epithet with the genus *Spyridium*.

As in the case of *S. bifidum* some syntypes are labelled wrongly as coming from "Marble Ra." instead of "Boston Pt.". Some of these specimens are mounted together with a twig of *S. bifidum* and a corresponding label citing the wrong locality for that taxon. Clearly the labels have been mixed up.

Etymology: From the Greek *stenos* (narrow) and *phyllon* (leaf), in reference to the species' long narrow leaves.

8a. *Spyridium stenophyllum* subsp. *stenophyllum*

Shrubs to 1.2 m high, resinous, especially on young stipules and bracts; young stems densely pubescent with white or grey long woolly stellate hairs, becoming matted when older. *Leaves* alternate: *stipules* triangular to narrowly ovate, 2.1–3.7 mm long, fused for more than half of their length, reddish-brown, glabrous, with hairs along midrib and cilia towards apex; *petiole* 0.9–1.6 (–2) mm long, glabrous, rarely with few hairs; *lamina* narrowly Y-shaped to narrowly cuneate, 4–7 (–8) mm long, 1.2–2.8 mm wide, base cuneate, margins revolute, apex deeply to shallowly emarginate or bilobed, each

lobe of the Y-shaped leaf with a recurved mucro, upper surface green, glabrous, rarely with a few simple hairs between the two lobes, lower surface with dense to medium dense indumentum of white stellate hairs, mostly obscured by revolute margin, usually only midrib visible, midrib with long simple hairs. *Floral leaves* usually 3–5: broader than stem-leaves, 3.2–5 (–7) mm long, 1.6–2.3 mm wide, covered with a very dense, white felty stellate indumentums, interspersed with antrorse to spreading longer simple hairs. *Inflorescence* a globular head of cymosely arranged ± sessile flowers, 6–9 mm diameter; *bracts* in fused pairs, broadly ovate, 2–3 mm long, with long cilia, outer bracts with hairs along midrib. *Flowers* white to cream. *Hypanthium tube* 0.4–0.5 (–0.8) mm long, 1.4–1.5 mm diameter, base and most of tube densely pubescent with short stellate and overlying long hairs, often flexuous. *Sepals* 0.5–0.8 mm long, as long as hypanthium tube, with an indumentum of mainly short woolly simple or stellate hairs, especially towards tip; *sepal:tube* ratio 1:1. *Petals* 0.4–0.5 mm long, cucullate, clawed; *limb:claw* ratio c. 4–5:1. *Stamens* subequal to the petals, 0.3–0.5 mm long; *anthers* c. 0.2 mm long. *Ovary* inferior, carpels 2, summit with dense stellate hairs; *style* 0.6–0.7 mm long, minutely bilobed. *Infructescence* slightly expanding, but no tiled bracts visible. *Fruits* obovoid, 1.7–1.9 mm long, c. 1.3 mm wide, light brown, consisting of 1–2 papery fruitlets, torus apical, fruit wall densely pubescent; *seeds* flattened ovoid, 1–1.3 (–1.4) mm long, 0.8–1 mm wide, reddish brown with sparse black mottles or no mottles and a darkened red-brown base. Fig. 6i–m.

Distribution & habitat: The typical subspecies is distributed around Arno Bay and along the east coast of Eyre Peninsula; scattered records are known from further inland, e.g. near Kimba and Caralue (Fig. 2). The taxon grows on sand.

Phenology: Flowering in July–Oct, Jan.; fruits recorded in Aug., Sep., Jan.

Notes: Leaves of the typical subspecies are usually narrower than in subsp. *renovatum*, and glabrous on the upper surface. A few intermediates are known from Hambidge Conservation Park, where the subspecies co-occur (*C.R. Alcock* 1091, AD 96709110; *R.L. Specht* 2404, AD 96108133). The typical subspecies also resembles *S. leucopogon*, which differs in having shorter and entire, not bilobed, leaves; this is a relationship that is under further investigation. Two specimens (*A.R.R. Higginson*

s.n. [ACB 44120]; M.E. Phillips 167) from near Kimba have a mixture of 2- and 3-locular ovaries and 2- and 3-fid styles.

Conservation: Most collections of the taxon are older than 20 years. Recently, it has been recorded from Hambidge Conservation Park and near Iron Duke mine. More research on the current distribution and conservation status is needed. The subspecies should be listed as 'Data Deficient' (NPWC 2003) and be prioritised for a formal assessment.

Specimens examined: SOUTH AUSTRALIA. EYRE PENINSULA: W side of Iron Duke mining lease at Monitoring Site 6-RA, 18 Sep. 2003, F.J. Bodman 11156 (AD); Above high water mark at N end of Boston Harbour, 200 m inland, 12 Jan. 1976, B. Copley 4930 (AD, BR, HBG); Hundred of Rudall, adjoining Rudall township, 23 Oct. 1971, Eyre Penins. Nature Conservation Group 2 (AD); Arno Bay–Port Lincoln Rd, c. 7 miles from Arno Bay, 22 Sep. 1966, J. Golbroith s.n. (AD); Kimba, 1955, A.R.R. Higginson [ACB 44120] (MEL); 10 km NE of Cleve, scenic lookout, 21 Sep. 1988, M. Hyde 252 (AD); Arno Bay, 29 Aug. 1935, E.H. Ising s.n. (AD); Hambidge C.P., Site: B5131-DAR00401, Patchid: 18197, 31 Oct. 2001, S.D. Kenny & S.M. Corruthers B513-688 (AD); Lincoln Hwy, c. 6 km NE of Arno Bay, 30 Dec. 1970, A.E. Orchard 2988 (AD); Caralue, Sep. 1933, Mrs Shuttleworth s.n. (AD); Flora and Fauna Res., Hundred of Hambidge, 8 Nov. 1960, R.L. Specht 2404 & 2431 (AD); Whyalla–Cowell Rd, c. 74 km S of Whyalla, 1 Oct. 1958, P.G. Wilson 97 (AD); c. 5 km S of Murdinga, 31 Aug. 1976, D.J.E. Whibley 5757 (AD); 25 miles from Kimba, towards Whyalla, 29 Aug. 1968, M.E. Phillips 167 (CANB, MEL).

8b. *Spyridium stenophyllum* subsp. *renovatum* Kellermann & W.R. Barker, subsp. nov.

A subspecies typica foliis indumento superficialis pilis simplicis antrorsis et lamina parum latiore differt.

Holotypus: SOUTH AUSTRALIA. Track N of BBQ track, Telowie Gorge C.P., 7 Mar. 2008, J. Kellermann 471, D. Duval & C. Brodie (AD). **Isotypi:** B, BM, CANB, MEL, NSW, NY, PERTH, SI, US, W.

Illustrations: E.M. Canning in J.P. Jessop & H.R. Toelken, *Fl. S. Australia* 2: 816, fig. 429A (1986), as *S. bifidum* var. *bifidum*.

Shrubs 30–1.5 m high, resinous; young stems densely pubescent with white, light brown or grey short felted-tomentose stellate hairs, sometimes also with longer simple hairs. **Leaves** alternate: *stipules* triangular to narrowly ovate, 2–3.8 (–6) mm long, fused for more than half of their length, reddish-brown, glabrous, with

hairs along midrib and ciliate towards apex; *petiole* 1–2.2 mm long, glabrous to sparsely stellate pubescent; *lamina* narrowly Y-shaped to narrowly cuneate, (3.4–) 3.8–7.5 (–9.5) mm long, 1–2.8 mm wide, base obtuse to cuneate, margins revolute, apex deeply emarginate or bilobed (very rarely almost entire), each lobe of the Y-shaped leaf ± obtuse and hidden by a tuft of hairs, upper surface greyish-green, with a medium to dense silky indumentum of antrorse simple hairs, lower surface with dense to medium dense indumentum of grey-white stellate hairs, midrib also with long simple hairs. **Floral leaves** usually 3–5: broader than stem-leaves, 4.2–7 mm long, 2–3.8 mm wide, covered with a very dense, white felty stellate indumentum, often interspersed with longer simple hairs. **Inflorescence** a globular head of cymosely arranged ± sessile flowers, (6–) 7–11 (–12) mm diameter; **bracts** in fused pairs, broadly ovate, 2–3 mm long, with long cilia and hairs along midrib. **Flowers** white to cream. **Hypanthium tube** 0.4–0.5 mm long, (1.2–) 1.5–1.7 mm diameter, with sparse simple hairs or glabrous, base densely pubescent with short stellate and overlying long hairs, often flexuose. **Sepals** 0.7–1 mm long, as long as hypanthium tube, with an indumentum of mainly short simple or stellate hairs, especially towards tip; sepal:tube ratio 1:1. **Petals** 0.5–0.7 (–0.8) mm long, cucullate, long-clawed; limb:claw ratio c. 3:1. **Stamens** subequal to the petals, 0.4–0.6 mm long; **anthers** c. 0.2 mm long. **Ovary** inferior, carpels 2, summit with dense stellate hairs; **style** 0.6–0.8 (–1) mm long, minutely bilobed. **Infructescence** slightly expanding but no tiled bracts visible. **Fruits** ellipsoid, c. 2 mm long, c. 1.5 mm wide, light brown, consisting of 1 or 2 papery fruitlets, torus apical, fruit wall densely pubescent; **seeds** flattened obovoid, 1.3–1.4 mm long, c. 1 mm wide, light brown with dense to sparse black mottles and a darkened brown base. Fig. 6n–p, Fig. 8d.

Distribution & habitat: This subspecies is mainly distributed in central and eastern Eyre Peninsula and the southern Flinders Ranges, west of Port Pirie, with a few isolated records from Burra Gorge on the east side of the southern Flinders Ranges. The taxon grows on sand-dunes and in mallee vegetation on sand, mainly over limestone, but some records also indicate shale, loam over quartzite and granite as substrates (Fig. 2).

Phenology: Flowering in May–Nov.; fruits recorded in Sep.–Nov. and Jan.–Mar.

Notes: The taxon is variable, e.g. in the density of the indumentum on the leaves and stems, and in the depth of lobing of the leaves. A few specimens from Eyre Peninsula and from the lower Flinders Ranges near Gladstone have leaves with an almost entire, emarginate apex (e.g. *Black 7*, MEL 233427; *James 114*, AD 96351166), not deeply Y-shaped as is usual for the species.

The species seems to form hybrids with *S. parvifolium* (specimens from Telowie Gorge and Napperby Gorge, e.g. *Bates 20478*, AD 98940201; *Spooner 6029*, AD 97919399), and possibly with *S. subochreatum* (F.Muell.) Reissek (*Udovicic 284*, CANB 480346). These specimens display intermediate characters, e.g. in the shape of the leaves and their venation (Fig. 6q).

Conservation: The subspecies is widespread and not considered at risk.

Etymology: The epithet *renovatum* is Latin, renewed, and refers to the former incorrect application of the name *S. bifidum* to this taxon. Its clarification has led to a renewed view of this taxon and the need for a new name.

Selected specimens examined (c. 170 seen): SOUTH AUSTRALIA. GAIRDNER-TORRENS: Hills NW of Yarna, Gawler Ranges, 24 May 1983, *R.J. Bates 3146* (AD). EYRE PENINSULA: Hiltaba Station, c. 2 km W Hiltaba Homestead, 6 Sep. 1972, *B.J. Blaylock 1967* (AD); 37.7 km from Kimba toward Cleve, 5 Dec. 1982, *E.M. Canning 5482* & *S. Corbett* (AD, CANB, HO, MEL, NSW); Road to Scow Ck from Wharminda, 18 Aug. 1978, *R.J. Chinnock 4305* (AD, MEL); Hincks C.P., c. 1 km along track which goes through centre of park from E boundary, top of first rise, 5 Jan 1996, *D.D. Cunningham 1247* (AD, CANB, MEL); 10.3–10.5 km W of Kimba on dune ridge, 7 Feb. 2006, *D.J. Duval 378* & *T.E. Erickson* (AD); Along Eyre Hwy, c. 25 km WSW of Kimba (27 km by road), 4 Oct. 1967, *H. Eichler 19231* (AD, B, CANB, CBG); Darke Peak Ra., central portion, 28 Oct. 1983, *E.N.S. Jackson 4982* (AD, GZU, HO, MA, SYD); Sheoak Hill C.P., Site: BS128-HEG00S01, Patchid: 19169, 2 Dec. 2002, *R.S. Johnson* & *J.Schofield BS128 1245* (AD); 9 km N of Pondoona turnoff on Lincoln Hwy, 3 Nov. 1992, *T. Hall 427* (AD, CANB, MO); On Caralue Bluff summit, 60 m SSE from SE corner of fence around communication tower, Caralue Bluff CR, Site: BS128-CAR00101, Patchid: 19129, 28 Nov. 2002, *A.C. Robinson* & *J.T. McDonald BS128 1572* (AD); Track to Blue Ra. from Whaminda Soak, 6 Sep. 2006, *T.S. Te 16* & *D.J. Duval* (AD, K); 14.4 miles [c. 23 km] N of Pt Neill, 12 Sep. 1970, *M.D. Tindale 471* (AD, K, NSW); Caralue Bluff, 29 Oct. 1983, *J.Z. Weber 8431* (AD, HO); Coolanie Ra., Mt Olinthus, 1 Oct. 1980, *D.J.E. Whibley 7264* (AD, CBG, MEL, ODU, OSH). NORTHERN LOFTY: Flinders Ra., near Gladstone, 9 Oct. 1909, *Anon. s.n.* (AD); Telowie Gorge area, 10 Oct. 1985, *R.J. Bates 6449* (AD); Upper eastern slope of The Bluff

Ra. c. 11 km SW of Wirrabara and outside southern boundary of The Bluff Ra. Native Forest Res., 18 July 2002, *P.J. Lang BSOP 525*; Hills to N of Napperby Gorge, 30 Sep. 1978, *A.G. Spooner 6000*(AD); Top of ridge, Whitecliff Ra., Beetaloo Valley, 14 June 1980, *A.G. Spooner 6961* (AD). MURRAY: World's End, Burra Creek Gorge, 30 Jan. 1998, *D.E. Murfet 3131* (AD).

Taxon excluded from the *Spyridium bifidum* – *S. halmaturinum* complex

Spyridium coactilifolium var. *integrifolium* Benth., *Fl. Austral.* 1: 431 (1863).

= *Spyridium thymifolium* Reissek, *Linnaea* 29: 289 (1858). — *Trymalium stuartii* F.Muell. ex Reissek, *Linnaea* 29: 289 (1858), *nom. inval. pro syn.*, as '*stuartii*'. — *Type citation*: 'Encounter Bay Nov. 1847 (Dr. F. Müller)'. *Holotype*: ?W. *Isotypes*: Encounter Bay, Nov. 1847, *C. Stuart s.n.* (MEL 2104786, labelled as "*Trymalium (Pomaderris?) Stuartii* Ferd.MII.>"). *Possible isotype*: Encounter Bay, *s.dat.*, *s.coll.* (K sheet with loan stamp H/1310/95 16/76, labelled as "*Pomaderris / Trymalium stuartii* F.Müller").

Spyridium stuartii Reissek & F.Muell., *Linnaea* 29: 289 (1858), as '*stuartii*'. — *Type citation*: 'Encounter Bay Nov. 1847 (Dr. F. Müller)'. *Lectotype (here designated)*: Encounter Bay, S.A., Nov. 1847, [*C. Stuart s.n.*] (MEL 2104271, labelled as "*Spyridium stuartii* Reiss. & Muell.>"). *Isolectotypes*: Encounter Bay, [S.A.] *s.dat.*, *C. Stuart s.n.* (MEL 2104272A, labelled as "*Spyridium Stuartii* F. Muell.>"; ?W.

Cryptandra obovata auct. non (Hook.) Hook.f.: Tate, *Handb. Fl. Extratrop. S. Austral.* 97 (1890), *pro parte*.

Reissek published *S. thymifolium* and *S. stuartii* simultaneously from material collected at Encounter Bay, listing under both taxa Mueller's manuscript name *Trymalium stuartii*. Reissek cited Mueller as the collector and Nov. 1847 as the collecting date. However, Mueller arrived in Australia on 18 Dec. 1847, after the collection date. The specimens were gathered by Charles Stuart, as is obvious from specimens at MEL and from the fact that Mueller named the species after the collector. Reissek distinguished the species by minor differences in indumentum and leaf size. Bentham first recognised that both names refer to the same variable species and subsumed both taxa under a variety of *S. coactilifolium*. Today the species is known as *S. thymifolium*. The name *S. stuartii* has not been used for the taxon since Bentham's time.

There are several specimens of Stuart's collection at MEL. Although *S. thymifolium* and *S. stuartii* were potentially described from the material collected by Stuart on the same day, we assume here that there is a type for each taxon. A collection labelled as "*Spyridium stuartii* Reiss. & Muell." by Mueller is selected as the lectotype of that species; a small twig labelled as "*Spyridium Stuartii* F.Muell." is most likely an isolectotype.

We regard another specimen, labelled by Mueller as being collected by Stuart and with the name "*Trymalium (Pomaderris?) Stuartii* Ferd.Mll. cl. Stuart leg." as an isotype of *S. thymifolium*, since here Mueller's manuscript name is mentioned on the label. Reissek worked in Vienna and the holotype of *S. thymifolium* should be sought at W. This choice of type also reflects slightly different leaf shapes indicated by Reissek and seen in the two specimens, with the isotype of *S. thymifolium* having almost round leaves and the lectotype of *S. stuartii* having ovate to elliptic leaves. A specimen at K is also labelled as "*Pomaderris / Trymalium stuartii* F.Müller" and a possible isotype, but it lacks details of the collector and date.

There is another quite deteriorated twig labelled as "*Spyridium Stuartii* Reiss & Müller" present on sheet MEL 2104272; however, this is not *S. thymifolium*, but possibly a small specimen of *S. fontis-woodii*, the label of which might have been mixed up with another collection.

Acknowledgements

We thank many people who have helped during the long preparation of this paper. Lisa Waters prepared the excellent line drawings; these were funded by a special grant of the South Australian Department for Environment & Heritage (DEH, now DENR) to the University of Adelaide. Information on Reissek's specimens in Vienna was provided by E. Vitek (W); J.E. Tonkin (Melbourne) searched for specimens at K and BM during her term as Australian Botanical Liaison Officer (ABLO). We are grateful for the assistance given in our respective field trips by our companions R.M. Barker, E. Kuzmanov, H.R. Toelken (AD), I.R. Thompson, F. Udovicic & N.G. Walsh (MEL), J.G. West (CANB) and family, L.I. Williams (Adelaide) and family. We are grateful to the directors and curators of BM, CANB, K, MEL and NSW for loan of herbarium specimens. This paper is written in preparation of *Flora of South Australia*

and *Flora of Australia* treatments of Rhamnaceae, the latter partly supported by the Australian Biological Resources Study (ABRS).

References

- Barker, W.R. (1995). *Spyridium erymnocladum*, a new species from Eyre Peninsula, South Australia, and new stipule characters in Australian Rhamnaceae. *Journal of the Adelaide Botanic Gardens* **17**, 17–22.
- Barker, W.R. (2005). 'Rhamnaceae', in W.R. Barker, R.M. Barker, J.P. Jessop and H. Vanaw (eds), *Census of South Australian vascular plants* pp. 90–91. Botanic Gardens of Adelaide & State Herbarium: Adelaide.
- Barker, W.R. and Rye, S.L. (1993). *Spyridium tricolor* (Rhamnaceae), a disjunct new species from the Great Australian Bight. *Journal of the Adelaide Botanic Gardens* **15**, 153–157.
- Bentham, G. (1863). 'Rhamneae', *Flora Australiensis, a description of plants of the Australian Territory* **1**, pp. 409–445. L. Reeve & Co.: London.
- Biological Survey, South Australia (2004). *Flinders Chase National Park (NPWS): interim flora species list*. Department for Environment and Heritage, South Australia: Adelaide. http://www.environment.sa.gov.au/files/e4fad3b6-2f77-425d-b730-9e4f00b404e7/flinders_chase_np_family.pdf [accessed: 10 Mar. 2011].
- Black, J.M. (1925). Additions to the flora of South Australia Na. 23. *Transactions and Proceedings of the Royal Society of South Australia* **49**, 270–275.
- Black, J.M. (1926). 'Rhamnaceae', *Flora of South Australia*, **3**, pp. 364–371. Government Printer, Adelaide.
- Black, J.M. (1952). 'Rhamnaceae', *Flora of South Australia*, ed. 2, **3**, pp. 544–553. Government Printer, Adelaide.
- Canning, E.M. (1986). '*Spyridium*', in J.P. Jessop and H.R. Toelken (eds), *Flora of South Australia* **2**, pp. 814–820. Government Printer, Adelaide.
- Carter, O. and Downe, J. (2006). *National recovery plan for the farked spyridium *Spyridium* species 1 (Little Desert)*. Dept of Sustainability and Environment, Victoria: Melbourne.
- D'Altan, S.E. (1913). Botany of the "Little Desert", Wimmera, Victoria. *Victorian Naturalist* **30**, 65–78 & pl. IV.
- Geographical Names Unit (2000-). *Place names online: South Australian state gazetteer*. Government of South Australia, Land Services Group: Adelaide. <http://www.placenames.sa.gov.au/> [accessed: 18 Aug. 2011].
- Georges, K.E. (1913). *Ausführliches lateinisch-deutsches Handwörterbuch, aus den Quellen zusammengetragen und mit besonderer Bezugnahme auf Synonymik und Antiquitäten unter Berücksichtigung der besten Hilfsmittel ausgearbeitet*. Hahnsche Buchhandlung: Hannover.
- Jessop, J.P. (1989). A list of the vascular plants of South Australia (edition III). *Journal of the Adelaide Botanic Gardens* **12**, 1–163.
- Kellermann, J. (2006a). *Cryptondro triplex* K.R.Thiele ex Kellermann, a new species of Rhamnaceae (Pomaderraeae) from Arnhem Land, Northern Territory. *Austroboileyo* **7**, 299–303.
- Kellermann, J. (2006b). New combinations for two species of *Spyridium* (Rhamnaceae: Pomaderraeae) from the Grampians, Victoria. *Muelleria* **22**, 97–104.

- Kellermann, J. (2006c). A range extension for *Cryptandra paganalaba* (Rhamnaceae: Pamaderreae) and recognition of a new subspecies. *Muelleria* **24**, 45–50.
- Kellermann, J. (2007a). *The Australian stellate-haired Rhamnaceae: a systematic study of the tribe Pamaderreae*. The University of Melbourne: Parkville.
- Kellermann, J. (2007b). Re-instatement of the name *Spyridium waterhausei* from Kangaroo Island, South Australia, with a short history of the tribe Pamaderreae (Rhamnaceae). *Journal of the Adelaide Botanic Gardens* **21**, 55–62.
- Kellermann, J., Rye, B.L. and Thiele, K.R. (2006). *Palianthian*, a new genus of Rhamnaceae (Pamaderreae) from Western Australia and Queensland. *Australian Systematic Botany* **19**, 169–181.
- Kellermann, J., Rye, B.L. and Thiele, K.R. (2008). Nomenclatural notes, typifications and name changes in *Trymalium* (Rhamnaceae: Pamaderreae). *Transactions of the Royal Society of South Australia* **132**, 18–28.
- Kellermann, J. and Udavicić, F. (2008). Large indels obscure phylogeny in analysis of chloroplast DNA (*trnL-F*) sequence data: Pamaderreae (Rhamnaceae) revisited. *Telopea* **12**, 1–22.
- Kellermann, J., Udavicić, F. and Ladiges, P.Y. (2005). Phylogenetic analysis and generic limits of the tribe Pamaderreae (Rhamnaceae) using internal transcribed spacer DNA sequences. *Taxa* **53**, 619–631.
- Landbeater, M.M. (2006–). *Adelaide Ca-operative History: Counties and Hundreds*. Family History South Australia, Barry Landbeater: Adelaide. <http://www.ach.familyhistorysa.info/> [accessed: 18 Aug. 2011].
- Lepšchi, B.J., Manra, A.M., Kellermann, J., Thiele, K.R., Udavicić, F., Walsh, N.G., Rye, B.L., Bean, A.R. and APC Working Group (2011). *Australian Plant Census: Rhamnaceae*. Centre for Australian National Biodiversity Research & Council of Heads of Australasian Herbaria: Canberra. <http://www.adelaide.edu.au/directory/juergen.kellermann> [accessed: 18 Aug. 2011].
- Mueller, F. (1855). *Definitions of rare and hitherto undescribed Australian plants*. Gaadanaugh & Trembath: Melbourne.
- Mueller, F. (1875). Rhamnaceae. *Fragmenta Phytographiae Australiae* **9**, 135–141.
- Mueller, F. (1882). *Systematic Census of Australian Plants with Chronological, Literary, and Geographic Annotations. Part I. Vasculares*. McCarran, Bird & Co.: Melbourne.
- Mueller, F. (1886 [1885]). *Key to the system of Victorian plants. II. Enumeration of the native species, arranged under genera and orders, with annotations of their regional distribution, and with xylographic illustrations*. Jahn Ferres: Melbourne.
- Mueller, F. (1889). *Second systematic census of Australian plants, with chronological, literary and geographic annotations*. McCarran, Bird & Co.: Melbourne.
- National Parks and Wildlife Council (NPWC) (2003). *2003 review of the status of threatened species in South Australia [discussion paper]*. Dept for Environment and Heritage, South Australia: Adelaide.
- Riesse, S. (1858). *Plantae Muellerianae: Rhamnaceae*. *Linnaea* **29**, 266–96.
- Richards, J.E., Fay, M.F., Crank, Q.C. and Chase, M.W. (2000). A revision of the tribal classification of Rhamnaceae. *Key Bulletin* **55**, 311–340.
- Rye, B.L. (1995a). New and priority taxa in the genera *Cryptandra* and *Stenanthemum* (Rhamnaceae) of Western Australia. *Nuytsia* **10**, 255–305.
- Rye, B.L. (1995b). New and priority taxa in the genera *Spyridium* and *Trymalium* (Rhamnaceae) of Western Australia. *Nuytsia* **10**, 119–140.
- Rye, B.L. (1996). A synopsis of the genera *Pamaderris*, *Siegfriedia*, *Spyridium* and *Trymalium* (Rhamnaceae) in Western Australia. *Nuytsia* **11**, 109–131.
- Rye, B.L. (2008). New species and keys for *Cryptandra* and *Stenanthemum* (Rhamnaceae) in Western Australia. *Nuytsia* **16**, 325–382.
- Tate, R. (1889a). A census of the indigenous flowering plants and vascular cryptogams of extra-tropical South Australia. *Transactions and Proceedings and Report of the Royal Society of South Australia* **12**, 67–128.
- Tate, R. (1889b). Definitions of four new species of Australian plants. *Transactions and Proceedings and Report of the Royal Society of South Australia* **12**, 129–131.
- Tate, R. (1889c). A revision of the flora of Kangaroo Island and other botanical notes relating thereto. *Transactions and Proceedings and Report of the Royal Society of South Australia* **12**, 62–66.
- Tate, R. (1890). *A handbook of the flora of extratropical South Australia, containing the flowering plants and ferns*. Education Dept: Adelaide.
- Thiele, K.R. (2007). Two new species of Australian *Stenanthemum* (Rhamnaceae), with a conspectus and key to species outside Western Australia. *Journal of the Adelaide Botanic Gardens* **21**, 67–74.
- Thiele, K.R. and West, J.G. (2004). *Spyridium burragarang* (Rhamnaceae), a new species from New South Wales, with new combinations for *Spyridium buxifolium* and *Spyridium scartechinii*. *Telopea* **10**, 823–829.
- Walsh, N.G. (1999). 'Spyridium', in N.G. Walsh and T.J. Entwistle (eds), *Flora of Victoria* **4**, pp. 115–120. Inkata Press, Port Melbourne.
- Walsh, N.G. and Stajsić, V. (2007). *A census of the vascular plants of Victoria*. Royal Botanic Gardens Melbourne: South Yarra.
- Weberbauer, A. (1895). 'Rhamnaceae', in H.G.A. Engler and K.A.E. Prantl (eds), *Die Natürlichen Pflanzenfamilien* **3(5)**, pp. 393–427. Wilhelm Engelmann: Leipzig.
- Willis, J.H. (1973 [1972]). *A handbook to plants in Victoria* **2**. Melbourne University Press: Parkville.
- Willson, A. and Bignall, J. (2008). *Draft regional recovery plan for threatened species and ecological communities of Adelaide and the Mount Lofty Ranges, South Australia*. Department for Environment & Heritage: Adelaide.